INFORMATION SYSTEM FOR PHARMACEUTICAL INDUSTRY: A CASE STUDY ON ITS DESIGN AND DEVELOPMENT IN CHENNAI (TAMILNADU)

THESIS

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DOCTOR OF PHILOSOPHY

By

K.THANDAVAMOORTHY

Under the guidance of

Dr. R. VENGAN



DEPARTMENT OF INFORMATION SCIENCE
UNIVERSITY OF MADRAS
CHENNAI – 600 005

FEBRUARY 2005

Dr. R. VENGAN
M.Sc., (Chem), B.Lib. Sc.,
A.D.I.Sc., Ph.D.,
University Librarian



Madras University Library
University of Madras
Chepauk,
Chennai – 600 005.
South India

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R. Vengan 23/2

R. VENGAN
Supervisor

DECLARATION

I here by declare that this thesis entitled, **"INFORMATION SYSTEM FOR PHARMACEUTICAL INDUSTRY: A CASE STUDY ON ITS DESIGN AND DEVELOPMENT IN CHENNAI (TAMIL NADU)"** is the result of investigation for the Degree of Doctor of Philosophy in Library and Information Science, University of Madras, Chennai. I carried out the entire research work under the guidance and supervision of **Dr. R. VENGAN**, University Librarian, Madras University Library, University of Madras, Chennai.

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Librarian
C.L.Baid Metha College of Pharmacy
Jothi Nagar, Thoripakkam,
Chennai – 600 096.

K. THANDAVAMOORTHY

Place :Chennai
Date: 23-02-2005.

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Dedicated to

my Beloved Parents,

Teachers, Friends, and

The Almighty



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CHAPTER 1

INTRODUCTION

"A broad scientific and technological research forms the backbone of industrial development in India"

By Jawaharlal Nehru

1.1 PRELUDE

Information is essential for each and every human activity in the world. It plays a key role in the overall development of any nation, because it encompasses all findings derived from human knowledge and scientific research and forms the basis for future research and development. Moreover, the socio-economic development of a country depends, to a great extent, on the development of industries, which generate resources. The development could be faster if increase in productivity at a faster rate is ensured, making use of recent information in industrial research. Obviously in developing countries, all efforts are towards this direction. As a result, the demand for information for pharmaceutical industrial growth has accelerated. [**Sasikala (1994)**][1]. According to **Wilkinson (1978)**[2] a better company information resource makes a better company, making a better contribution for the national economy. Information required by industry encompasses several categories of information viz. scientific, technical, engineering, economic,

CHAPTER 1

INTRODUCTION

"A broad scientific and technological research forms the backbone of industrial development in India"

By Jawaharlal Nehru

1.1 PRELUDE

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legal and management. The Pharmaceutical Industry in India is one of the most socially relevant industries; hence there is scope for study on its information structure.

Pharmaceutical Science is as old as human civilization. The Word **Pharmacy** is derived from the Greek word **Pharmakon** meaning **Medicine** or **Drug**. The subject of Pharmaceutical Science may be defined as art and science of preparing and dispensing medicines and includes the requisite knowledge and skill to carry them out in practice.

The success of Health Science and Medical Science depends on Pharmaceutical Science. Due to the ever-developing nature of pharmaceutical technology, there exists a need to upgrade the knowledge of information sources and services pertaining to pharma sector which inturn is necessary for the medical professionals, who are related to pharmacy directly or indirectly.

Information

The term **information** has been derived from Latin terms **Forma** and **Formatio**, both these words convey more or less the same meaning of giving shape to something and forming a pattern. The terms such as thought, knowledge, facts, data, ideas etc., are used as synonyms or near synonyms for the term **information. [Kumbar Goudar, (1998)][3].** Education and Research are the basic means through which new information is generated and communicated. Any information is effective and useful only if it is to be communicated. Information sources are the channels through which the information gets disseminated.

Information Users

Like all other scientific and technical disciplines, pharmaceutical science and technology is also dynamic in nature. As such, it is imperative for the pharmacists, medical practitioners, scientists, pharmaceutical industrialists and medical librarians to know about pharmaceutical information sources and services.

Information need

Continuing research and development activities have resulted in large increase in information, leading to **Information Explosion**. It is noted that more than 20,000 scientific and technical articles are published worldwide in one day. As such, it becomes inevitable for the medical professionals to search mass of information rapidly for the satisfaction of a specific information need. Further, for the pharmacists, who want to keep up-to-date, reliance on the traditional printed form of literature is no longer sufficient. Hence, the pharmacists and the other medical professionals must be aware of the new sources for locating the data/information, have access to them and know how to use them effectively and keep abreast of the changes in the pharmaceutical science and industrial technology.

Pharmacy

Pharmacy is based on the theories of the medical, pharmaceutical and social sciences. Therefore, every pharmacy scientist has an obligation to support the advancement of these sciences through research. History has

shown that the results of such research can make a vital contribution to the improvement of pharmaceutical care and other related fields of activities.

Pharmacy scientists are responsible for selecting drugs from hundreds of manufacturers, research and development establishments. Those that will enable them to fulfill an important obligation; assuring that their doctors and patients receive pharmaceuticals and related supplies at the lowest cost consistent with high quality.

1.2 GROWTH OF PHARMACEUTICAL INDUSTRY IN INDIA

The first mention of a chemist's shop opened in India can be traced back to 1811, when a young Scotch named Mr. Bathgatem, who came to India with the East India Co., opened his shop in Calcutta. This firm took up manufacture of tinctures and spirits in 1910, one hundred years after it started its retail and dispensing business. The firm of Smith Stanistreet & Co., was started in 1821 as a small apothecary shop, and commenced its manufacturing business only in 1918. They were the first to take up the manufacture of pure alkaloids like strychnine and brucine and they were at one time the biggest manufactures in the work of these alkaloids. Even today the firm exports these alkaloids.

At the beginning of the twentieth century, Drug Industry was practically non-existent in India, and almost all the requirements of pharmaceuticals were imported form abroad mainly from the United Kingdom, France and Germany.

In 1901, a small factory known as the Bengal Chemical and Pharmaceutical Works with a Capital of Rs. 25,000/- was started in Calcutta by Acharya Prafulla Chandra Ray. In Bombay, in 1903, Prof. T. K. Gajjair, opened a small factory at Parel. This factory led to the development in 1907 of another important pharmaceutical manufacturing concern, the Alembic Chemical Works Ltd., for which Baroda was chosen as the site. Professor Gajjar was joined in his venture by his two friends, Sri A. S. Kotibhaskar and Raj Mitra B. D. Amin. Today, Bengal Chemical and Alembic Chemicals occupy a position of pride among the pioneer manufacturing concerns of India. [**Gopalakrishna Murty, (2000)**][4].

The World War I changed the situation, and cheap drugs in finished condition were imported in large quantities from abroad. The demand for indigenous products also increased. The spirit of Swadeshi (Indian made) gained ground, and consequently quite a few Indian and foreign firms sprang up for the manufacture of various types of Pharmaceuticals at cheap rates, with a view to compete with imported ones. Price and not the quality was the main consideration. Hence, an unhealthy competition grew up, and the markets were flooded with both indigenous and imported, inferior, adulterated, misbranded and under standard drugs. The public opinion was so strong that the government could not ignore it and had to take notice of the prevailing chaotic and deplorable conditions in the drug trade and industry. Though there were in force even then the Poisons Act (1919) and Dangerous Drugs Act (1930), they were not comprehensive enough to control the prevailing unhealthy and harmful conditions. Hence, the Government of

India appointed a Drugs Enquiry Committee under the Chairmanship of Lt. Col. R. N. Chopra. The committee submitted a voluminous report to the Government suggesting creating drugs control machinery at the centre with branches in all the states. The committee also recommended a Central Drugs Control Laboratory, formation of Central Pharmacy Council and the Provincial Pharmacy Councils. It took practically a decade before the Drugs Act, 1940 was passed, and it took almost another decade to pass the Pharmacy Act 1948.

In the matter of medicinal drugs, India was until 1948, manufacturing mainly processed products, e. g. tablets, ampoules etc., besides vaccines and sera. It depended on foreign countries for supplies of medicines, raw materials, and even packaging materials.

Since then the Industry has evolved in four stages, the early years covering the two decades between 1950 and 1970, the regulated stage between 1970 and 1980 when the price control began to be applied, the development stage during 1980 to 1995 enriched the development of the Industry, and the current stage facing the challenges of the millennium consequent on global changes relating to social, economic and political life of the people.

After independence, India started putting its energy to economic development in all the sectors and even the pharma industry was not left untouched. Since then the progress of this industry has been substantial and can be called multidimensional (see Table 1.1 & 1.2). The scenario today, is

that we are highly self sufficient in both the bulk drugs and finished formulations. You can see the real turning point came in the 70s when Indian government introduced the new patent act, which recognized only process patents, not product patents. This allowed Indian pharma companies to manufacture drugs discovered by international companies. This not only boosted the Indian companies but were also resulted in a fiercely competitive domestic market with world-class products at affordable prices to the Indian diaspora. Even the job opportunities which pharma industry offers today is helping India in its social development. According to OPPI (Organisation of Pharmaceutical Product of India)1999-2000 annual report, 28.6 lakh people (direct and indirect) are employed with the Indian pharma industry. **[Indian Pharma...]**[5].

Table 1.1: Progress of the Indian Pharma Industry Since Independence

Year	Status	
1950s	Formulations	Mostly imported, MNC dominance
1960s	Formulations	Domestic endeavour on imported bulk drugs
1970s	Formulations Bulk drugs	Some imports Indigenous manufacture by domestic companies
1980s	Formulations Bulk drugs	Marginal imports (<5%) Significant indigenous manufacture (based on domestic R & D)
1990s	Formulations Bulk drugs	Significant exports, minimal imports (<2%) Self reliant (exports > imports)

(Source: Report of Pharmaceutical Research & Development Committee, 2002).

Table 1.2: Pharma Sales Since 1948

Year	Status (Rs. Crores)
1948	10
1954	54
1960	70
1961	85-90
1968	175
80-81	1500
1999 – 2000	16,000
2002 – 2003	20,000

In India, apart from the software industry, the pharmaceutical sector is the only one showing a constant growth of 15%. With the implementation of TRIPS (Trade Related Intellectual Property Rights) agreement, which will allow the protection of product patents in India, the total scenario is going to change soon. This would demand the Indian Pharmaceutical Industry to spend more on R&D and to compete with the International Market. An analysis of ability of Pharma Industry in facing the post GATT (General Agreement on Trade and Tariff) challenges indicates that weak information base as one of its weakness and increasing the information base/dissemination as one of the issues, which need to be addressed to. **[Gopalakrishna Murty, (2000)]**[4]

In this connection understanding other Indian Medical Systems will strengthen our study.

1.3 MEDICINE IN VEDA

Medical treatment all over the world has always been associated with religious service and ceremony. India's work in science is very old. It was subsidiary interest of her priest. The records of Hindu Medicine begin with the *Atharva-veda*. Here one finds a list of diseases with the symptoms embedded in a mass of magic and incantation. Medicine arose as an adjunct to magic. Appended to the *Atharva-veda* is the *Ayurveda*, the Science of Longevity. According to this system, illness is attributed to disorders in one of the four humors: air, water, Phlegm and blood. The treatment for any of the above humors is recommended with herbs and charms, a psychological aid. Many of the diagnosis and cures are still used by the Ayurvedic Physicians, with a success which sometimes created envy and at other times arouses admiration among the practitioners of the Western (Allopathic) system of medicine. In the *Rig-veda,* there is information about 1000 herbs, and water is prescribed as the best cure for most diseases. Even in Vedic times physicians and surgeons were living in garden houses where they cultivated their own medicinal plants. They were differentiated from magic doctors who exist even today in some parts of rural India. **[www.indianembassy.org]**[6]

There were no separate professions of Medicine and Pharmacy in those days as they exist today. A physician prepared his own medicines and quite often the directions for treatment required preparation of remedies from herbs, etc. by the patient's household members. Even today many among the reputed Ayurvedic physicians prepare their own medicines though with the

establishment of large manufacturing drug houses for Ayurvedic medicines, also the practitioners of indigenous system of medicine have started following the modern practice of prescribing prepared medicines.

The great names in Hindu Medicine are those of **Sushruta** who lived in the fifth century before **Christ**, and was a student of **Dhanwantari** and **Charaka** who lived in the second century after Christ.

Chemistry developed in India from two sources- medicine and industry. The Indian name for chemistry is Rasayana Shastra, which means Science of Mercury. It was used internally by the Hindu physicians in various forms. Nagarjuna, the noted Hindu physician who is reported to have flourished sometime between the fifth century B. C. and second century B. C. wrote a voluminous work on Mercury. In Europe, mercury was introduced internally only in the Sixteenth century, having been introduced in Western therapy by **Paracelsus**, the Swiss physician, alchemist and chemist.

1.4 INDIAN SYSTEMS OF MEDICINE AND HOMEOPATHY

Indian Systems of Medicine such as *Ayurveda, Siddha* and *Unani* and drugless therapies like *Yoga* and *Naturopathy*, have been widely practised in India. Centuries ago these systems attained a high level of development and were the only stream of treatment in pre-British India. Homeopathy though relatively a young system of medicine, which originated in Germany, has been widely accepted and practised in India.

The *Vaidyas* and *Hakims* had been practising these systems on the strength of their own merit. Public demand has given rise to a large number of practitioners without adequate training on the one hand and manufacture of non-quality medicines on the other. However, in post-Independence India, the Government recognised the merit of each of the Indian Systems of Medicine and Homeopathy (ISM&H) and made attempts to develop them as viable systems of medicine for the health care needs of our people. It was felt that the goal of World Health Organisation 'Health for All' cannot be achieved through the modern Allopathic system alone and there is need to involve the ISM&H practitioners in the national mainstream for achieving this goal. This has resulted in recognising our traditional systems of *Ayurveda, Siddha* and *Unani*, Homeopathy, yoga and Naturopathy as National Systems of Medicine along with Allopathy. This recognition has paved the way for the organised development of all these six systems of Medicine based on their individual merit and strength. Each of these systems of medicine is based on its own individual philosophy and principles. Each has its own core areas of strengths and weaknesses. ISM&H systems of medicine are found to be safe, easy to use, economically viable and are widely accepted by the masses. These systems have had a broad policy support of the Government. As a result, a broad institutional framework exists today [www.indianembassy.org][6].

1.5 HEALTH AND FAMILY WELFARE: Institutional Framework

The institutional framework of health and family welfare systems in India consists of

(1) Statutory Regulatory bodies.

(a) Central Council of Indian Medicine, and

(b) Central Council of Homeopathy.

(2) Apex Research Councils.

(a) Central Council for Research in Ayurveda and Siddha (CCRAS),

(b) Central Council for Research in Unani Medicines (CCRUM),

(c) Central Council for Research in Homeopathy (CCRH), and

(d) Central Council for Research in Yoga and Naturopathy (CCRYN).

(3) Four Pharmacopoeial Committees for different systems of Medicines.

(a) Ayurvedic Pharmacopoeia Committee,

(b) Unani Pharmacopoeia Committee,

(c) Siddha Pharmacopoeia Committee,

(d) Homeopathic Pharmacopoeia Committee.

(4) National Institutes of Ayurveda, Homeopathy, Naturopathy and Unani Medicine.

(5) Pharmacopoeial Laboratory for Indian Medicines, Ghaziabad.

(6) Homeopatic Pharmacopoeial Laboratory, Ghaziabad.

(7) The Rashtriya Ayurveda Vidyapeeth, New Delhi.

(8) The Indian Medicines. Pharmaceutical Corporation Limited, Mohan (in Distt. Almora, UP), and

(9) Department for Indian Science, Medicine and Health, Government of India.

The following are the thrust areas of development fixed for the above institutional framework.

- Improvement and up gradation of standards of education in ISM&H;
- Standardization of Drugs and quality control;
- Ensuring sustained availability of raw material, *i.e.,* medicinal plants, metal and minerals, materials of marine and animal origin, etc.;
- Research and Development;
- Information, Education and Communication; and
- Participation of ISM&H in the National Health Care Programme and Family Welfare Programme.

1.6 RESEARCH AND DEVELOPMENT IN PHARMACY

The four apex research councils, viz., Central Council for Research in Ayurveda and Siddha (CCRAS), Central Council for Research in Unani Medicines (CCRUM), Central Council for Research in Homoeopathy (CCRH) and Central Council for Research in Yoga and Naturopathy (CCRYN), and are carrying out research activities like clinical research, drug

standardisation research, drug proving research, family welfare research, tribal research, etc. The CCRAS has more than 86 units in the country. The Council has patented 18 Ayurvedic and Siddha drugs. The CCRUM has a network of 32 institutions/units spread all over the country. This council is in the process of patenting the products developed by it. CCRH has a network of 50 institutes/units in the country. The CCRYN is providing grants to voluntary yoga and nature cure institutions for undertaking various activities, viz., conducting clinical research, strengthening patient care centres, running one-year diploma course and conducting seminars/workshops/ conferences, etc.

A Central Research Institute in yoga now merged with the Morarji Desai National Institute of Yoga, Delhi has been providing training in yoga and also treatment to the public. A new dimension has been added to research activities. Under a scheme of Extra Mural Research, financial assistance is provided to accredited research institutes for conducing research activities. **[www.indianembassy.org]**[6]

1.7 PHARMACY EDUCATION

The development of pharmacy in our nation had its roots established in Ayurveda. The education in medical sciences was fashioned in India by the Gurukul System run by ancient Rishis in the Vedic Age. A vast literature is available on **Vrikshha Ayurveda** . Huge universities namely, Takshasila, Nalanda and Vikramsila came to be set up at in between the 6th Century B.C and 5th Centuries A.D. The higher education system including medical science

flourished in ancient India; continued to influence developments during its subsequent ages, in spite of diverse forms that develop under the impact of changes in religion, and in social, economic and political life.

The profession of pharmacy has made remarkable and significant progress during the last 56 years since Independence. The **Pharmacy Council of India (PCI)** began from a search for correcting the then prevailing deplorable state of pharmacy practice in India. The pharmacists, who were unknown entities, were designated as compounders before the promulgation of pharmacy Act. PCI by giving an industrial slant has brought pharmacy education on forefront of technical education. For over five decades education system evolved under the ambit of PCI had an industrial slant. This was necessary in the earlier stages after independence and today we are reaping its fruits. We can be proud of our institutions; Completion rates for students are among the best in the world. It could mean more number of students geared up for doing well on their examinations. Overall there is an increase in the percentage of students successfully completing this professional course of pharmaceutical sciences. The skill, creativity and research developed through pharmacy education are a major factor in our success in creating jobs and in our prosperity. The benefits of pharmacy education for individuals are far reaching. On an average, pharmacy graduates get better jobs and earn more than those with general sciences or commerce education. But somewhere during the past 50 years there was need to change gear which did not happen, as a result pharmacy education in modern India remained more or less inward looking, under-developed and under utilised health care resource. The

pharmacists became distributors of medicines. Pharmacy practice did not move toward a patient–centered pharmaceutical care practice from the traditional product-oriented, fiscally focused practice. Concept of pharmaceutical care remained a distant dream.

Indian Pharmacy education can result in the following degrees

1. Diploma in Pharmacy (2 years)
2. B.Pharm (4 years)
3. M.Pharm (2 years)
4. Ph.D. in Pharmacy

The Indian M.Pharm Degree appears to be the closest to the US Pharm.D. Degree as it studies more on disease states, while the Ph.D., centers on drug development. Moreover, Pharmacy Education in India is industry focused. Industrial pharmacy is the driving force behind the industry–focused curriculum in the pharmacy institutions throughout the country therefore Indian Pharmacy education focuses primarily on pharmaceutics, and less on the clinical and patient side. Typically D.Pharms works at chemist shops and in hospitals. B.Pharms either work in industry or are medical representatives. M.Pharms and Ph.Ds typically work in R&D in pharmaceutical companies.

Two statutory bodies namely, Pharmacy Council of India (PCI) and All India Council for Technical Education (AICTE) governs pharmacy education in India **[Kale, (2004)]**[7].

Institution-Industry Link – Better interaction between pharmacy institutions and industry is the need of the hour. This will have great bearing on the Pharmacy curriculum, exposure of industrial atmosphere to pharmacy students and subsequent placement of young graduating pharmacist in industries across the country. With the advent of globalization and opening up of Indian economy to outside world, competitions among industries have become stiff. To solve their problems they look up now to pharmacy Institutions. Similarly, there is an urgent need to prepare pharmacy students for jobs in multinational companies, by exposing them to newer technologies. These objectives can only be achieved well by bridging the gap between industry, academic institute and government as these three bodies have both synergistic and diverging interests in scientific education.

1.8 HEALTH, MEDICINE AND INFORMATION

Members in every community of the world became specialists in the use of plant and animal products for the treatment and cure of diseases. While in England the early physicians delegated to themselves the diagnosis and treatment of diseases, and assigned to their assistants and apothecaries, the tasks of preparing the medicines. In India the physicians kept to themselves even the work of preparing the various preparations.

Early records show that there existed about 1900 B. C. a street of druggists' shops in the town of Sippara on the River Euphrates. There were apothecaries, shops in Alexandria in 300 B. C. The Book of Ecclesiastes refers to complimentary roles of physicians and apothecaries thus: 'The

physician is worthy of honour and his skill is to be admired. With medicines he both heal a man and take away his pain and of such medicines do the apothecary make a healing ointment' [www.indianembassy.org][6].

The pharmaceutical field is research–based and wide–ranging and scientifically, those engaged in this research are both **consumers and generators of information,** and the contribution of industrial scientists to the general advancement of science is a substantial fact which is sometimes overlooked. In view of the highly competitive market situation, however, pharmaceutical companies are careful to protect their intellectual property since this leads eventually to their profitability. Ironically, the principle means of accomplishing this, the **patents system**, was conceived originally as a **way of transmitting information.** The increasing collaboration between the academic and industrial sectors is managed through legal agreements and /or licensing arrangements on the free flow of information.

Most research work in pharmaceuticals is targeted, not only in a scientific sense but also commercially. As a consequence, there is a substantial and continuing demand for information concerning regional disease profiles, health care systems, market sizes, regulatory constraints, competitor activities, sales statistics and the like. A pharmaceutical company, in summary, tries to minimize vested research and development effort and protect the knowledge it has acquired whilst, at the same time, ensuring that the conduct of its work conforms with international standards and is geared to major health problems. If the return on invested capital and labour is inadequate, the organization cannot survive in capitalist systems such as

prevail in most Western countries. The principles are clearly different in socialist states but fewer pharmaceuticals arise from these sources.

The necessity of retrieving information from external sources has led to increased expenditure by the industry, particularly during the **Information explosion** of recent years. Coupled with the high costs of generating and managing information in-house, this rate of expenditure means that the industry spends very freely on information handling. The scale of this situation is such that there is no effective alternative to mechanisation and it is perhaps one of the irritating aspects of the Information Age that the early perceptions for most people are that it is all about high technology and electronics. Such perceptions have adopted the wrong perspective since what the Information Age is (or should be) about is harnessing knowledge, improving the management of information and making it more generally available so that better informed decisions can be made for universal benefit.

Information flow with a pharmaceutical company can be visualized as a process of absorbing information from outside, adding to it by virtue of the company's own efforts and channelling the enriched information to protect and nurture developing products and, finally, releasing it outside once more to promote the safe and effective use of licensed products. The process continues long after marketing through post-marketing surveillance. However carefully pharmaceuticals are tested prior to release, clinical trials are very limited in scope compared with the size and nature of the eventual consumer population.

It should be apparent by now even to those unfamiliar with the pharmaceuticals business that the industry generates information and disseminates it to all sectors of the community: researchers, advisers, prescribers, dispensers, and the general public. To some extent this happens spontaneously but there is now in place a regulatory framework, anchored in the developed world but gradually extending elsewhere, which ensures that key information is obtained and provided.**[www.indianembassy.org]**[6]

1.9 GATT AND THE INDIAN INDUSTRY

1.9.1 India joining GATT

Indians were very good in Process Technology and Indian Scientists could develop their own process once any new molecule was introduced overseas and the molecules were introduced in Indian market within a span of 3 to 5 years. This is because India was not a signatory to the Paris Convention and was not member of GATT at that time. Original Researchers called new molecule introduction with minor variations in process technology by Indian companies as PIRACY. However, with the policy of Industrial Liberalisation and to bring a global discipline, a number of issues connected with international agreement on trade related aspects of Intellectual Property Rights (IPR) have been discussed and the negotiations concluded in 1993. The outcome of the final Uruguay round of discussion is the GATT Agreements, 1994, the final text signed by 115 countries who are members of WTO.

1.9.2 Terms of GATT

The GATT agreements cover every aspect of international movements of goods and services along with protection and enforcement for technological innovation. The salient features of GATT are:

- Trade Related Intellectual Property Rights (TRIPS)
- Trade Related Investment Measures (TRIMS)
- Trade in services<196>agreement (GATS)

The objective of the TRIPS agreement is protection and enforcement of intellectual property rights to promote technological innovation and to the transfer and dissemination of technology for the mutual advantages of producers and users of technological knowledge. It contains specific provisions and scope of patentability of drugs and agrochemicals. The TRIPS agreement also provides that patents shall be available and patent-right enjoyable without discrimination as to the place of invention, field of technology and whether products are imported or locally produced. On fulfilment of certain conditions Exclusive Marketing Rights (EMR) will be allowed to the patentee to protect the innovations or product patent and prevents other from making, selling or distributing such products even if manufactured by alternate process.

Since Patentability extends to products or process the terms of the patent would be applied for twenty years for Product patent and then twenty years for process patent, particularly in the chemical field including drugs and

pesticides. In the case of drugs and medicines, patents will be available for its dosage forms and their combinations. New process would be patented and new dosage forms etc. would also be patented and this kind of monopoly protection in some forms or the other, would in a period of 10 to 15 years, cover almost 70/80% of turnover in the pharmaceutical industry.

1.9.3 Transitional arrangements

Under TRIPS agreement, developing countries including India are entitled to delay the enforcement by ten years for amending their Patent rules and regulations. Indian Drug industry shall have access to manufacture the drugs which are currently under Patent as a result of filing application before 01.01.1995 in any country in the world and the off-patent drugs in the generic forms, provided that the processing technology is developed in India.

1.9.4 Impact of patent regime on Pharmaceutical Industry

The specific fall out of the changes that would be made in the patent laws on the basis of the provisions in the TRIPS agreement would be manifold. The consumer will be hit by high prices and erratic availability of pharmaceuticals, medicines etc. and the domestic industry would face the question of survival.

1.9.5 Impact on Research and Development

To establish an identity in the international market, research and development activities have to be strengthened with substantial investment by Indian firms. As a result of the availability of the patents in drugs and

medicines, Multinational companies will not be interested to establish separate R&D centres in India. If fact, it will be difficult for domestic companies to be able to match multinational companies potential in R&D sector, sales turnover and world-wide infrastructure for patenting and promotion of their products. Further to achieve significant performance on the basic R & D front in India, Government will have to come forward in a big way to support public and private efforts on a long term basis.

1.9.6 Future Strategies to face New Challenges

Now that the GATT is a reality and will come into force within agreed time frame, the Indian companies are visualising the best possible means to encounter the situation. The more forward looking and internationally minded among them have evolved a two-fold strategy:

- To strengthen R&D capabilities during the 10 year transitional period.
- To enter into strategic alliance with research-based companies abroad for setting up joint ventures in India or licensing in patented new Drugs.

Both the Government policy of granting automatic approval for joint ventures in which foreign investment is up to 51 percent (which is applicable to the Drug industry) and the new incentives being considered for total R&D should go a long way to encourage indigenous companies to adopt the future strategy **(Ghose Dastidar)**[8].

1.10 PROPOSED RESEARCH

In today's world, information is an important ingredient in every walk of life and has become an indispensable tool for effective decision making from the individual to the National/International level. It is a well-accepted fact that a country that possesses the capability to utilize quality information can achieve excellence in socioeconomic development and health is an essential component of the same. Intervention with the aid of medicines forms a vital aspect towards the maintenance of health and hygiene and thus pharmaceutical information is to be recognized as an important part of the information packages. As a consequence pharmaceutical information needs are increasing in variety and diversity with respect to level, frequency, volume and use.

After independence Indian Pharmaceutical Industry has steadily grown to the present state of an organized industrial sector. This sector has to face the challenges arised out of the post GATT era. One such challenge is the information input for the development of pharmaceutical industries. Naturally there exists a problem of study and analysis of the pharmacy industrial information system in the past and the present and to findout a new progressive model of integrated Pharmacy Information System (PIS), which will disseminate the required information to meet the demands of the pharmaceutical industries in post GATT era.

In this study an attempt has been made to understand the information needs of Pharmaceutical Industry which are expected to arise in the post GATT(General Agreement on Tariffs and Trade) era and also suggest

strategies for the improvement of the library and information services of pharma industries with special reference to those located in and around Chennai city, Tamil Nadu. Further, suggestions towards popularizing, creating awareness and the use of information systems for pharmaceutical industry has also been attempted. At this juncture, it is necessary to understand the Pharma Industry Scenario in Tamil Nadu.

1.11 PHARMACEUTICAL INDUSTRY IN TAMIL NADU

At present the industrial scenario in Tamil Nadu (TN) appears to be changing with notable developments in the last few years of some of the largest industrial houses in the country, SPIC and the JK Group entering the pharmaceutical arena with a mega joint investment of around Rs.400 crores in world-sized Penicillin G plants at Cuddalore, which at full production will constitute around 40% of the Countries demand for this product. This is the starting material for a variety of semi-synthetic antibiotics of the Penicillin and Cephalosporin series. This will pave the way for TN to become a leader in the fermentation technology field. The setting up of a `State of the Art' pharmaceutical R & D Centre by SPIC also foresees a definite future **[Nair (1996)]**[9].

On the bulk drugs and formulations sector, several companies have plans for producing a large number of products for the domestic and export markets, some of them with captive long term tie-ups. A fast growing company in the export sector of bulk drugs is Orchid Chemicals and Pharmaceuticals Ltd., whose performance in the year 1995–96 has been impressive with a turnover of Rs.111.88 crores within just years of being set

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up and recording a growth of more than 100% in both sales and net profit in the first half of 1996–97. *Shasun Chemicals and Drugs Ltd.*, is another bulk drug unit that has carved out a sizable export market. Also the Governments intention to provide incentives for the setting up of bulk drug units within the state is gratifying **[Senthilkumar (1996)]**[10].

While most companies are manufacturing commodity formulations, a few like Tablets India Ltd., have specialised products, e.g. : nutritional therapeutic agents, and the amino acid infusions for the domestic and export market. ***Malladi drugs*** is a leading producer of Ephedrine in the country for the domestic and export market. Tamil Nadu Dadha has earned a niche market in selected anti-cancer drugs, bulk drugs, and formulations.

Technically qualified personnel are behind the success of any industry. Often lack of sufficient number of qualified pharmacists is quoted for substitution by others. With the increasing number of pharmacy colleges in the state and with expected increase in the quality of education imparted, awareness will increase and the industry is bound to see some transformations.

With the emerging trends in Tamil Nadu, if the possibilities are tapped while the time is ripe, it may not be long before the State finds itself among the leaders in the pharmaceutical world.

1.11.1 Small Scale Industries (SSI) –Pharmaceutical

The Tamil Nadu pharmaceutical manufacturers generate Rs 1800 crores every year that contributes to seven per cent of the national turnover. Small Scale Industrial units in the State contribute at least Rs 1000 crores. Many of these companies have a total investment of a minimum of Rs 20-30 lakhs to bigger SSI units like Fourtts, Apex and the like with at least rupees one crore of investment **[Paul (2002)]**[11]

The Tamilnadu Medical Sciences Council (TNMSC) spends around Rs 100 crores on drugs each year. There are so many SSI units in TN from which the TNMSC can purchase the drugs. **[www.expersspharmapuls.com]**[12]

1.11.2 Biotechnology at Tamil Nadu

Tamil Nadu has emerged as a front ranking State in attracting investments. The growth in knowledge-based industries in the State in recent years has been phenomenal. The export of software from the State, which was only Rs. 37 crores in 1995-96, has reached Rs. 1,914 crores in 1999-2000. In order to consolidate these gains and carry the State forward in the path of economic development, the Government of Tamil Nadu has decided to focus on another knowledge-based industry, i.e. Biotechnology.

Industrial activity so far in the area of Biotechnology has been largely in first generation Biotechnology like fermentation of antibiotics. A number of Tissue Culture units to produce food and ornamental plants have also been set up by leading industrial houses in Tamil Nadu. Thus, Tamil Nadu has the

potential to create a critical mass of industrial activity in Biotechnology, graduating from the current first and second generation Biotechnology projects to modern Biotechnology products involving recombinant, DNA-based products and Bioinformatics. In line with the developed world, the Government would strive to focus on modern processes in the area of agriculture, industry, medical and veterinary sciences and environment, together with focus on traditional Biotechnology products, especially in the area of industrial and food enzymes where there are a number of opportunities to tropicalise products which are already in the western world. These are likely to provide good commercial opportunities in the short-term and need to be included in any co-ordinated steps taken by the State in Biotechnology **[www.techno-preneur.net]**[13].

1.11.3 Medical Biotechnology

Tamil Nadu would present an attractive market for Medical Biotechnology products as it accounts for about 11% of the pharmaceutical market in the country. Apart from penicillin manufacturing and a reasonably large number of loan licence formulation units, investment in this sector within the State has been low. Hence Biotechnology presents an ideal opportunity for the State to reverse this trend.

Innovative efforts to collaborate with strong institutes within the State will be encouraged. For example, collaborative efforts with the TB Research Centre, Chennai, to develop an effective vaccine, will be highlighted. The vast collection of clinical specimens and the work going on at this Institute as

well as several others would be showcased for further research and product development. A few other areas of focus under the Medical Biotechnology will be:

- Diagnostics
- Vaccines (Hep C, Malaria, etc.)
- Therapeutics (Interferon, Insulin, etc.)
- Veterinary Drugs (including vaccines)

1.11.4 Medicinal Plants Biotechnology Park

A Medicinal Plants Biotechnology Park will be set up near Madurai. This Park will focus on Medicinal Plants and opportunities for sourcing of raw materials in a sustainable manner and value addition to scientifically tested herbal medicines. This Park will also provide facilities for growth of traditional medicinal systems. This Park will be established in the Industrial Park promoted by State Industries Promotion Corporation of Tamil Nadu Ltd., (SIPCOT), near Kodaikanal Road where 380 acres of land have already been acquired and developed. TIDCO and SIPCOT will jointly work on commercializing this project.

1.11.5 Pharmaceutical in Chennai

Historically, Chennai is known for its engineering and more particularly for its auto components industry. Compared to that, the drug industry in the city or, for that matter, in the state is of recent origin. Within a short span of time, Chennai has evolved into a key pharma center. This can be

rightly attributed to the entrepreneurial talents of many experts in pharma industry management. Tamilnadu, and the city of the Chennai attracted many investors in pharma sector. Companies like TTK Pharma Ltd. (herbal based formulation), Tamil Nadu Dadha Pharmaceuticals. (now Sun Pharmaceutical Ltd.,- bulk drugs and formulations), Mount Metter Pharmaceutical Ltd. (IV fluids), ICI India's Pharma Division (formulations), Malladi Drugs, Amrutanjan Ltd. (this firm apart from manufacturing pain balm also produces formulations and bulk chemicals). Other firm like Tablets India etc also started their operations.

This apart, Chennai has the credit of housing several global capacity bulk drug facilities. The efflux of time saw newer investments into the domestic pharma sector also with the patent laws and WTO as well as GATT agreements many major players in pharma industry are re-energising their operations and chalking out strategies to meet the emerging global requirements **[Jagannathan (1999)**[14].

1.11.6 Pharmacy Profession and Education in Chennai

In the British India the beginning of pharmacy education was made at the **Madras Medical College in 1860**. The students were trained in the areas of compounding and dispensing according to pharmacopoeial methods. After 1866 students were awarded certificate of Qualification to work as chemist and druggist. In 1894 a two years course after lower secondary was introduced with a syllabus guided by the Pharmaceutical Society of Great Britain **[Pharma Education…].**[15] Tamil Nadu Pharmacy Education includes

(i) 2 years diploma in Pharmacy, (ii) Four years B.Pharm, 2 years M.Pharm and Ph.D. in advanced pharmacy.

1.12 STATEMENT OF THE RESEARCH TITLE

"Information System for Pharmaceutical Industry: A Case Study on its Design and Development in Chennai (Tamilnadu)"

1.12.1 Explanation of the Concepts in title

Information system

Information system is an organized procedure for collecting, processing, storing and retrieving information to satisfy a variety of users needs.

Information needs of pharmaceutical industry refer to the information needs with respect to types, products and personnel of the pharmaceutical industry using various sources and channels.

Information needs is an activity of an individual in the process of identifying a message that suits industrial based knowledge.

Pharmaceutical Industry

Pharmacy is based on the theories of the medical, pharmaceutical and social sciences. Therefore, every pharmacy scientist has an obligation to support the advancement of these sciences through research. History has shown that the results of such research can make a vital contribution to the improvement of pharmaceutical care and other related field of activities.

The Pharmaceutical Industry in India has come a long way since 1901 when the foundation of the modern Indian Pharmaceutical Industry was laid by the Bengal Chemical and Pharmaceutical works in Calcutta. Since then the Industry has evolved in different stages.

In India, apart from the software industry, the pharmaceutical sector is the only one showing a constant growth of 15%. With the implementation of TRIPS (Trade Relation Intellectual Property Rights) agreement, which will allow the protection of product patents in India, the total scenario is going to change soon. This would demand the Indian Pharmaceutical Industry to spend more on R&D and to compete with the International Market.

Chennai (Tamilnadu)

Chennai is the major producer of software professionals in India and has largest mainframe capacity in Asia. It is one of the constituent States of Indian Republic, situated on the South Eastern side of the Indian Peninsula. It is having an area of 1,30,058 sq.km. Chennai (Formerly Madras) is the capital of Tamilnadu, having an area of 173 sq. km.

Availability of infrastructure facilities determines the pace of economic development of a Chennai region. SIDCO has three industrial estates and there is a scope for setting up industrial complexes for particular group of industries in the existing industrial Estates. The Information Technology Park will give opportunity for setting up electronic, telecommunication and Information Technology Industries with the assistance of highly skilled

manpower available in the field. The Survey has identified that there is scope for, in Chennai, nearly 175 pharmaceutical industries situated.

1.13. OBJECTIVES

The objectives of the study are:

i. To identify the structure of pharmaceutical organization / companies with respect to their type, products and staff.

ii. To have firsthand information on the pharmaceutical industrial information awareness, information behaviour and information channels used.

iii. To know the Pharmaceutical Industries habit of information collection, organisation and use for a purpose.

iv. To study the existing Library/ Information facilities at Pharmaceutical Industries.

v. To have information on the view of Pharmaceutical Industry on the usefulness of their company libraries.

vi. To identify the Pharmaceutical Industries awareness and priority of Information Technology based new information services.

vii. To offer suggestions if any for the improvement of the existing library and information services in the Pharmaceutical Industries.

viii. To suggest a model for research and development oriented Pharmaceutical Information System (PIS) to satisfy the current information needs and those, which arise in the post GATT era.

ix. To suggest strategies towards popularizing, creating awareness and the use of the PIS.

1.14 HYPOTHESES

Based on the objectives, the following hypotheses were framed

i. There exists uniformity in the information needs among Pharmaceutical Industries for their research, development, production and marketing and product diversification.(directional)

ii. Pharmaceutical Industries mostly depend on their industry library for satisfying their information needs. Since most of the industrial libraries are specialized in nature to meet the demand of their clients. (directional)

iii. Pharmaceutical Industrialists are more satisfied with their resources and channels they use (directional).

iv. There exists heterogeneity in the motives for information collection by the Pharmaceutical Industry based on their products and processes. Since the products and processes are different for different industries. (directional)

v. There exists differences in the degree of relevance and dependence in the nature and type of information sought by the industry (directional).

vi. Sharing of information among the industries is a prevailing phenomenon in these pharmaceutical industries, if situation demands. (directional).

vii. INTERNET and e-resources are widely used by pharma industry because the pharma information is available in e-forms.(directional)

1.15 LIMITATIONS

Due to the Researcher's constrains of distance, time and money, this study has been limited to the Pharmaceutical Industries in and around Chennai City, which represents majority of the Pharmaceutical Industry in TamilNadu.

1.16 SIGNIFICANCE OF THE STUDY

- This study would throw light on the present state-of-the-art-of Pharmaceutical Industries in and around Chennai with respect to their information infrastructure and information requirements.
- The study highlights on the status of the library and information services used by Pharmaceutical Industries.
- This study of information needs of the Pharmaceutical Industries provide an understanding, which directs the libraries of Pharmaceutical Industries to develop from its present status to the level of satisfying their Information Technology cultured user's demand.

1.17 ORGANISATION OF THE THESIS

The thesis is organized in six chapters. The first chapter is introductory, traces the growth of Pharmaceutical Industry in India in general and in Tamil Nadu in particular. Indian systems of medicine and homeopathy, institutional framework of health and family welfare, R & D in Pharmacy, Pharmacy education are some of the concepts described in brief. Pharmacy Information and its relevance in post GATT era was highlighted. This chapter presents the

need for the proposed research, further highlights objectives, hypothesis, limitations and significance of the present study.

A survey and appraisal of literature relevant to the problem under analysis pertaining to Pharmaceutical Information System is presented in Chapter 2. The review of literature has been presented under the headings. General User studies, Industrial Information System, Medical User Studies, Pharmaceutical User studies and Information System Design, to derive more understanding of the present study.

The third chapter presented the methodology adopted for the study. Sources of data, the sampling design and also the justification for the sampling framework are provided in this chapter. The questionnaire constructed for the survey is described in all its aspects. Procedures followed in the data collection, data types and the variables considered for analysis are also described. A description of the statistical procedures viz., Correlation technique, WAM, frequency, cluster analysis, dendrogram and proximity matrix adopted for data analysis are also given in this chapter.

The fourth chapter discusses the results of the analysis and interpretation of the data collected through questionnaire for assessing information needs of Pharma Industrial organisations in and around Chennai City. In addition to simple analytical methods, some statistical techniques such as WAM, co-relation techniques, cluster analysis, proximity matrix etc., have also been employed to analyse the collected data.

The summary of major findings and observations, besides suggestions and recommendations including areas for further research are given in Chapter 5.

The sixth chapter presents a descriptive prototype model of Pharmaceutical Information System (PIS) which is in effect, a model to highlight and identify information as one of the important components of Pharmaceutical Industry Management in the Post GATT era.

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Chapter 2

Survey of Literature : Pharmaceutical Industrial Information System

CHAPTER 2

SURVEY OF LITERATURE:

Pharmaceutical Industrial Information System

2.1 REVIEW OF LITERATURE

Review of literature is an essential component of any research investigation, which gives necessary information to the investigator to frame the research study on the chosen topic. The purpose of the study is to investigate the information habit, awareness, availability, and utilization behaviour of pharmaceutical industrial personnel involved in the pharmaceutical practices, besides to identify the structure of pharmaceutical establishments. This study also analyses as to whether the existing Pharmaceutical Library /Information facilities are adequate or not, or users expect more modern information services. The components involved in this part of study are information habit, purpose of information seeking, types of information, channels of information, mode of information seeking, information time, information use satisfaction, use pattern and other related variables with respect to pharmaceutical library use.

Library information use studies have been conducted in sciences, social sciences and humanities for a number of years. They were first

conducted in sciences in the 1940s, and 1950s, in social sciences in the mid – 1960s, and in humanities in the 1970s. **[Pfeister, (1981)]**[1]

However this present survey will focus on user studies related to Pharmacy Information Behaviour.

As far as the information system for pharmaceutical industry, information user studies and information needs of a group of users in a particular field are concerned, a large number of studies have been conducted, and it is growing rapidly. A number of research reports, articles, books and conference volumes on the subject of information system for pharmaceutical industry have been published. User studies in general will also be described.

For the present study the review of literature has been grouped in to the following five major headings.

- General User Studies
- Industrial Information System
- Medical User Studies
- Pharmaceutical User Studies
- Information System Design

2.1.1 General User Studies

The Annual Review of Information Science and Technology **(ARIST)** periodically review the relevant literature on "information needs and uses".

So far fourteen volumes during **1966 to 2003**[2-18] have provided elaborative review on this subject.

Disch (1976)[19] states that the user, such as a practical engineer, has a number of down-to-earth information requirements which are often ignored by sophisticated information systems. Discusses a survey of 1,400 Norwegian engineers' information habits, and concludes that the most specific information sources were used more often than the general ones, and that frequency of use differs for different sources. Following the obvious conclusion that traditional information sources are not in great demand, a more detailed survey was carried out, in which information habits were recorded over a 30-day period. Outlines the user's opinions about available information sources, and states that the user must be made information-conscious and that information systems should be adjusted to meet users' needs. Describes the activities of a problem-solving team of both information specialists and R and D workers established to overcome these difficulties.

Martin (1976)[20] says whilst there has been a long history of reader studies in American librarianship very few studies have attempted to discover why users turn to the library and what effect library use has. Various types of user studies commonly employed by librarians are discussed and the problems and limitations of such studies, particularly those of the general or inclusive category, are indicated. Non-user studies have much potential value but the operational expertise and costs involved suggest that cooperative action is required, e.g., libraries with similar population compositions might combine

in funding studies. Includes guidelines for user studies and raises questions about the effect of such studies on library planning.

Allen (1977)[21] pointed out that many user studies have been performed and thus generated a correspondingly large volume of data. They have been for the most part piecemeal in approach and there has been little or no attempt to integrate their results into a more complete systemic understanding of the communication process in science and technology.

Solutions to this conceptual or methodological approach have been varied and often reflected the wider debate-taking place in the social sciences of the opposing merits and demerits of qualitative and quantitative approaches **[Mintzberg (1979), Patton (1980), Price (1965)** and **Cozzens (1985)].**[22-25] Some of the unproductive stream of user studies, preferred to abandon all descriptive studies for a greater concentration on the design of ever more effective, efficient systems. The primary objective of user studies is to provide data for systems design **[Skelton, (1971)].**[26] Individual characteristics may have accounted for a great deal of the variance, but since one cannot do anything about them they are of little importance to the policy maker or system designer. Instead, there should be a new generation of user studies whose criterion of success should not be how well they describe user behaviour, but rather how much impact they have on the reformulation of information policies. **[Mick, Lindsey and Challan (1983)]**[27]

Elmar Mittler (1980)[28] Reports on the user problems indicating experiences in West Germany, with short enquiry sheets, which are directed

towards the practical performance of the library. Reports on the questionnaire and results of the user research project carried out at the University library of Heildelberg. Concludes that the enquiry sheets and their answers not only provide important suggestions but are also a basis for arguments when wishing to implement new library policy.

Wilson (1981)[29] determine the information retrieval there is virtually no other area of information which has occasioned as much research effort and writing as 'user studies'. Within user studies the investigation of 'information needs' has been the subject of much debate and not little confusion. Attempts to reduce the confusion by defining some concepts, and by proposing the basis for a theory of the motivations for information-seeking behaviour.

While reviewing the literature on the information needs and uses of humanities scholars in universities, [**Stone (1982)**][30] concluded that the literature is piecemeal, at times confusing and that progress in providing guidelines to librarians on the basis of systematic enquiry is slow.

Russell (1983)[31] suggested the timely, relevant information must be the goal of information services. Librarians and information officers need to distinguish and meet the information requirements of administrators, research workers, advisers, educators and regulatory/diagnostic staff. Each of these groups has a distinct need for information and marketing approach must be taken to the provision of information services in the most appropriate format. Although books and journals continue to have an important role in the

transmission of information, audio visual and electronic media are starting to play an increasing role in the industrialised world. Online accesses to databases through conventional computer systems or through systems such as videotext are becoming part of the information environment. In industrialised countries user demands are leading to the emergence of a new breed of information officer who has to be as conversant with floppy discs and video screens as historically librarians have been with books and journals. Education and training institutions must take these factors into account if they are going to equip their students for a future rule in the information sector.

Jeffrey Katzer (1987)[32] points out a trend caused by advances in technology, changes in the economics of information systems, and challenges to what can be learned from previous studies of information behaviours. This trend is pushing information science and the study of information user into accepting as essential more complexity in the phenomena studied. Argues therefore, that those engaged in the study of information users might do well to question the viability and usefulness of the current assumptions underlying information science, and to consider communication variables and methods as a source for new approaches to the study of user behaviour.

Ingwersen (1987)[33] examines the key problem of the nature of the information need, and the cognitive viewpoint and structures in information provision; relationship to other sciences: deals specifically with the cognitive sciences such as linguistics, psychology and psycholinguistics and artificial intelligence.

In the study of information use pattern of Indian historians, **Karisiddappa, Sangam and Maheswarappa (1989)**[34] identified the difficulties the historians experiencing in the use of information; its awareness and usefulness of information services provided by **NASSDOC** (NAtional Social Science DOCumentation Centre), New Delhi.

Sathish (1990)[35] analyses the attitudinal behaviour and its relation to information use and suggested that books stand first followed by the periodicals, abstracting and indexing sources, book reviews, workshops and seminars, experts, colleagues in the order of strength of relations of sources and attitude towards information.

Palmer (1991a; 1991b)[36,37] in his study shown that number of population of information users, even as they work together and share common goals, can be undifferentiated wholes. Different sections of population require different treatments depending on their discipline, the length of time they have spent in the organization, their roles and tasks and their cognitive styles. Further **Palmer, (1991c)**[38], claims that qualitative evidence from the interviews reveal quite a range of information products available, even among those who use the library and the online services.

Brown (1991)[39] determined three dimensions of information seeking behaviour such as the conditions, the context and the process, as well as the interaction among these dimensions. Further he also reviewed the barriers to information seeking behaviour.

Gupta (1991)[40] has reviewed the literature on information seeking behaviour over years, which covered more than 140 references published mostly in journals, edited books and conference volumes from India. Perhaps this is the most comprehensive review on the subject of information seeking behaviour.

Kuhlthau (1991)[41] described the user's perspective of information seeking and derived a model of the information search process in the study.

Over the last three decades, information seeking has gained increasing prominence as an issue for user-centered information seeking research. Some key work that has contributed to an understanding of the relationship between wider information tasks and uncertainity in information seeking has been performed by **Kuhlthau (1993)**[42] on the theoretical foundations of the Information Search Process (ISP) models.

Ellis (1993)[43] focused the employment of the grounded theory approach to derive the information seeking patterns of academic researchers.

Vengan (1993)[44] studied the user behaviour of three groups of library users, who are involved in technology transfer (TT) – researchers, technology transfer agents and industrial managers. This study is based on user specific questionnaires. Questions were asked to find out the respondents background, information gathering habit, awareness and utilization of information, use of information channels and services, future requirements and the use pattern of IISc library. About 256 variables were used to collect data on 47 categories of information.

The most important conclusions from the study are: (i) the information available, awareness and utilization of information by the three groups is high enough but the groups, depending upon their needs, access and time available at their disposal for information services get to collect information at varying levels. However, there is a high level of use of the library support services from the IISc library, (ii) that the three groups although served efficiently by the libraries, do, infact, prefer to have new information services, with the installation of the latest and fastest information technologies, and (iii) that the groups show high discrimination in terms of library information availability, awareness, utilization and also IISc Library use, as far as researchers are concerned. There are within group differences in access, availability, awareness and utilization and thus they show a different information – seeking behaviour. Computerisation of library activities is the major suggestion by the three groups of users. A few suggested improvement in library facilities, maintenance and user education.

Dalai and Ramesh (1994).[45] Reports of a study, based on data collected from the circulation desk, daily observations and questionnaire user survey, to evaluate the library resources of the Regional Research Laboratory, Bhubaneswar, India. The purpose of the study was to determine: the extent of library use; needs and requirements of various categories of users; peak hours of highest usage; and period of transactions at various service points

Kuhlthau (1994)[46] studied the information seeking behaviour of students doing a research assignment, formulated a model depicting common patterns of tasks, feelings, thoughts and actions.

McClure et al., (1994)[47] states that primary information on any discipline has now become available electronically as well. For instance, users will have access to the electronic full-text versions of scientific journals, electronic textbooks and enable the users to consult information outside the library.

Cathleen (1994)[48] has emphasized the library user community the means of intricacies to access the information in an easy manner. Further stressed the need for information system to provide effective information services.

Langer and Wilson (1994)[49] state of the art review of the needs of users of chemical information online databases. Accuracy, comparability, completeness, consistency, and timeliness of the information are high on the list of desiderate of these users. Data from various sources should also be merged more easily. Users show great concern for the pricing levels and especially for online pricing levels. The properties of compounds, including stereochemistry, 3D structure information, economic information, toxicity, and environmental behaviour, must be made more searchable. The user friendliness of the services is of a high priority.

Lundeen, Tenopir, Wermager (1994)[50] studied the information needs of Hawaii's rural health care practitioners and their methods of accessing through interviews and mailed questionnaires and identified the barriers to information access.

The information seeking behaviour of managers in industrial organizations in Andra Pradesh was examined by **Sasikala (1994)**[51] and revealed that the managers occasionally visits libraries and collect information to keep abreast of current knowledge.

Bystrom and Jarval (1995)[52] revealed that a person's information seeking depends purely on ***task complexity,*** and he indicated the systematic and logical relationships among task complexity, types of information channels and sources.

Leckie, Pettigrew and Sylvain (1996)[53] developed a general model of information seeking and practices of three groups such as engineers, health care professional and lawyers based on the six components such as ***work roles, associated tasks, characteristics of information needs, awareness, sources and outcomes.***

A methodology for the identification of information needs of users in a specific environment, has been designed by **Devadasan and Pratap Lingam (1997)**[54]

Wilson (1997)[55] reviewed the literature of information seeking behaviour in a variety of discipline, other than Information Sciences and presented a general model of information seeking behaviour.

Solomon (1997)[56] explored the sense making approach that took place from the point of view of time and timing, social communication aspects of

works life and personal sense making styles, which included cognitive, affective, and co-native elements.

Srikanth Reddy (1997)[57] has presented a case study of information dissemination centre in Hyderabad. This paper briefly mentions resources sharing, its need, objectives, budgetary constrains of the library in the Developing Countries, and insufficiency of individual's resources to meet the information

Secker and Stoker (1997)[58] Reports the conduct of the user needs assessment for the eLib News Agent for Libraries project to provide an electronic current awareness service for different categories of information professional. Discusses those findings, which relate to the attitudes of information professionals to such services. The user needs assessment was conducted during summer 1996, making use of both Focus Group interviews and an electronic mail Questionnaire. The main problems experienced by information professionals in keeping up-to-date were: a lack of time and the pressure of work; irrelevant and inappropriate information; information overload; not knowing what is available or where to find it; the volatility of information; and a lack of resources. Relatively little use was made of formal current awareness services, but a great deal of use was made of informal sources such as discussions with colleagues, membership of groups, and attendance at conferences.

Malmsjo (1997)[59] Reviews the factors related to the environment and situation influencing users' information seeking behaviour and the various

models and equations reported in the literature to describe this activity in a quantitative manner. Overall, the aim is to examine the degree to which these models of information seeking behaviour can be of use in designing practical information systems.

Vakkari and Kuokkanen (1997)[60] analyses the growth of information science theory by using a case from information user study. It is found that scientific growth is identified with the growth of theories. The results of reconstruction, specification and enrichment of the theory shows future prospects for developing it and thus it creates potential growth of knowledge within the theory on information seeking.

McKnight and Meadows (1998)[61] on their survey and statistics in practice; held at Loughborough University, 2-3 June 1997. Reports results of initial findings from user studies of electronic periodicals in which users from 6 academic disciplines participated as part of the Cafe Jus project (Commercial And Free Electronic Journals: User Studies). The survey was conducted at the Pilkington Library, Loughborough University: where access to commercial and free electronic periodicals has been provided via its Web pages on the University's information gateway. The questionnaire survey was distributed to 4 groups of users, drawn from 6 departments at Loughborough University: academic and research staff; research students; taught masters degree students of the 1995-1996 cohort; and taught masters degree students of the 1996-1997 cohort. Although 66 per cent of students claimed that the electronic periodicals were easier to access than the paper versions, this satisfaction was with the complete process of access, including going to the

library from their department. Lists other problems associated with the use of electronic periodicals.

Gerhard, (1998)[62] also emphasizes the need for libraries to adopt new and creative models for managing the workflow associated with electronic resource management. She notes that the ethereality of electronic resources make them more difficult to accommodate with existing workflows related to acquisitions, check-in, cataloguing, and provision of access. She insists on the importance of a flexible, changing model, since "the unpredictability of [electronic resources] also prevents us from writing a simple, one-size-fits-all procedure for handling them."

Wilson (1999)[63] presented models of information seeking and other aspects of information behaviour. He describes the relationship between communication and information behaviour and suggested that, these models addresses issues at various levels of information behaviour, which can be related by envisaging a ***'nesting'*** of models.

Wijngaert, Wilson and Allen (1999)[64] explains the use of information and communication technology from a user perspective concentrating on the relationship between information need and media choice. Analyzes the results of a questionnaire survey of a sample of respondents taken from the student population of Dutch Universities in an attempt to ascertain the following information: the level of media use; media choice; the effects of differences between needs on media choice; and the effect of differences between users

on media choice. Multivariate analysis reveals that media choices depend on all characteristics of the information need.

The concepts of interaction and interactivity presented in different theoretical models in the fields of human-computer interaction and information seeking /search behaviour has been explored by **Beaulieu (2000)**[65] and related these to information retrieval research.

Miller (2000)[66] Collaboration has also been identified in the literature as an effective means of dealing with changes in workflow, introduced by the rapid integration of electronic resources into library collections. To Identifies the organizational change as one of the major consequences of an increasing reliance on electronic resources, and notes that the "interconnectedness of library activities, which appears to have significantly increased with the use of electronic resources, reinforces the need to reorganize library functions." The traditional subject and functional divisions that exist in most academic libraries are becoming less relevant in the new paradigm, and new models need to be tested.

Pinfield (2001)[67] argues that libraries must adjust the traditional model of subject librarianship to satisfy the demands of the hybrid library -- one that combines access to traditional and electronic resources. He notes that one of the ways in which the role of the subject librarian can be usefully extended into the electronic library environment is through participation on multi-disciplinary teams, and notes definitively that "the days of the autonomous subject librarian are over."

Erdelg and Ware (2001)[68] have provided findings regarding the types of secondary information resources that can be used to find competitive intelligence on small, Internet start-up companies. Also provided insight into the characteristics of the overall information-seeking strategies that are applied in competitive intelligence research. In their findings, they have found four group of resources that the students under study were using. They are web resources (company website, search engines, government websites, other business websites), commercial on-line databases (Lexis/Nexis, Dialog), Print resources and other resources. 58% of the respondents use web – based resources as a means for finding information.

2.1.2 Industrial Information System

MaGuire and Kench (1971)[69] have reviewed the information requirement of independent manufacturers in New South Whales, Australia, in regard to:

- the use of printed sources,
- the sources of useful information,
- the most recent information need,
- the agencies they consulted for business information, and
- their attitudes towards these agencies, particularly libraries.

The information-seeking strategies that the managers had used to solve a recent problem have been identified and differentiated between the most

frequent problems encountered by business managers and their efforts in locating the information for solving the same.

Marie (1980)[70] discusses the provision of information for industry in New Zealand and considers the effect that the spread of micro-processor technology is likely to have on information retrieval, and suggests some strategies and tactics which librarians should develop for holding and communicating information.

Roberts and Clifford (1986)[71] has investigated the demand and supply of business information of manufacturing firms and identified marketing, products, exporting, finance, competitors and patents the main areas where information needed.

White and Wilson (1988)[72] examined the relationship between managers' organizational roles and functions and their information needs and uses. The case studies of ten manufacturing firms indicated that a straightforward correlation between roles and information needs couldn't be asserted. The study identified the following four main areas were external information were required viz.,

- the need for information about customers,
- about competition,
- on statutory regulations, and
- the problems of export.

Maheswarappa and Nagappa (1990)[73] on their surveying the information needs of the *Indian Research and Development Scientists* showed that books, monographs and periodicals were the most frequently used formal sources of information by the Indian social scientists. Timely information is found to be the problem for more than 40% of the users. Colleagues were the most frequently used informal source.

Vij (1990)[74] indicated that the current, specific and exhaustive information, were the requirements of Scientists. Current abstracting periodicals were the primary sources of information collection in their research work. The scientists however, showed differences in the use levels with junior, intermediate and senior cadres. Importantly, Vij pointed out that the services of libraries designed to fulfill the needs of the Scientists have not changed whereas the methods of providing services have changed. Further changes are imperative due primarily to advances in technologies and information explosion.

Ward (1990)[75] has described the vast range and quantities of information required and produced throughout the drug research, development and marketing life cycle. It is evident that the pharmaceutical industry is an information intensive industry.

Graham Mackenzie, Ray Prytherch and Maurice Line (1991)[76] reviews trends in information provision for industry and business with reference to: in-house services; public sector support (national, public and

academic libraries); and private sector support (information brokers, Chambers of Commerce).

Janostikova, Kniznice (1993)[77] discusses the problems experienced by Czech industry and examines the relationship between industry and information. To increase the momentum of industrial development, information services provided to industrial establishments must be: unbiased, objective and complete. Information sources need to be carefully selected and must be delivered taking into account of all relevant factors.

Auster and Choo (1993)[78] **(1994)**[79] have done research on how top managers acquire and use information about the external business environment in the Canadian publishing and telecommunication industries. The data suggest that the chief executives concentrate their scanning on the competition, customer, regulatory, and technological sectors of the environment.

Choo and Auster (1993)[80] refer to previous research and conclude that informal sources, including personal contacts, are frequently preferred as important as and sometimes more important than formal information sources.

Gessesse (1994)[81] reviewed the information seeking behaviour of pure scientists and engineers and states that the ways and means in locating and using the right kind of literature pertinent to their respective fields differs.

Sasikala (1994)[82] reports results of a study of the information and library use behaviour of 436 managers in 3 groups (senior, middle, and junior)

from 20 industrial organizations in Andhra Pradesh. These show that: managers seldom visit libraries; that they try to satisfy their information needs from other sources as well as from libraries; managers need data type information firstly and descriptive information on specific topics secondly; managers collect information to keep abreast of current knowledge, to solve immediate practical problems, and additional information relating to the job. There are some differences in search and use behaviour among the 3 groups.

Love (1994)[83] implemented the Government's role in the electronic era: user needs and government's response. Discusses the issue of whether information should be regarded as a commodity to be charged for or to be provided free of charge in light of the controversial proposal of the Library of Congress to introduce a fee for use. Discusses the issue of pricing in light of the pricing policies of the National Technical Information Service (NTIS).

Yusoff (1994)[84] revealed most of the research and policy analysis in the area of information technology (IT) focuses on the process of technology acquisition, adaptation and diffusion. Much less attention has been given to factors and policies that affect user behaviour and their needs. Discusses the profound changes in IT trends, in particular the shift from stand alone equipment and applications to computer based networking and new information services, and its implications to users. Physically, this involves using telecommunications to connect formerly distinct IT equipment in the library, such as personal computers (PCs), dot matrix printers and word processors to equipment such as scanners, CD-ROMs, optical discs, laser printers and others. Qualitatively, such networks mean a shift from data

processing and transmission to new forms of information and knowledge flows, providing the basis for new services in the economy. Concludes with recommendations for a review of the information policy and for the setting up of an information infrastructure as an agenda for action to meet user needs.

Swan and Brown (1996)[85] Reports the results of 2 questionnaires examining the use of business information by end users. The First questionnaire was sent to corporate end users in the UK. 198 questionnaires were sent with a response rate of 49 percent. The Second questionnaire was sent to 595 faculty members from 11 business schools worldwide with a response rate of 10 per cent. The questionnaire concerned access to and use of a range of work related information and the perceived value of business information. Identifies differences between the groups and key issues including: attitudes to electronic delivery, ease of use versus content and perceptions of future requirements.

Grygierczyk (1997)[86] pointed out the tasks of the library may reach beyond the efficient and effective supply of information. Researchers and managers do not merely consume information, but they also communicate intensively, with their colleagues. When they read scientific articles, many researchers want to respond, ask questions to the authors, or give critical comments. In effect, the first academic journals, which appeared in the seventeenth century, supported this type of academic dialogue. The exchange of research results and attempts to refute and validate them through debate and comments are no less important than the access to the relevant sources of information



The context of information needs of managers and engineers may be seen in the general information-seeking model developed by **Wilson (1999)**[87] who suggests that information needs and information-seeking behaviour are influenced by following factors: the environments (political, economic, technological, etc.), role-related requirements, and personal factors.

Fan, Stallaert and Whinston (2000)[88] describes the enterprise system has the advantages of managing and integrating almost all of the business processes in the whole company, there have been strong criticisms that the enterprise system often imposes its own logic or business process on a company and lacks flexibility and adaptability in today's dynamic business environment. The goal of this paper is to outline a new approach in enterprise system development. We analyse the factors that affect the adoption of enterprise systems. Market and business changes, and advances in information technologies call for a more flexible, open, and scalable enterprise architecture.

Nichols and Martin (1997)[89] **and Mahapatra and Panda (2001)**[90] analyses the information needs of the journalists, which provided an insight into the myriad means of information resources.

Brashers, Goldmith and Hsieh (2002)[91] contend, for example ,that an individual might adopt an information blunting strategy when there is a possibility that new information will conflict with their existing health beliefs. Analysis of the Questionnaire data indicated that the survey respondents included both information monitors and information blunters, and that

consideration of information seeking styles was an important element of an effective information dissemination strategy.

2.1.3 Medical User Studies

Anderson and Latiolais (1965)[92]; **Francke (1965)**[93]; **Parker (1965)**[94]; **Pellegrino (1965)**[95] **and Wittrup (1965)**[96] have published much data concerning the use and need for adequate drug information in the treatment and care of patients. Many elaborate systems have been developed and put into use by pharmacist in the large teaching centers. In the small community hospital, it is not possible to install or staff such a drug information center. However, it is not impossible to provide the clinical staff with much vital information concerning the use and abuse of drugs, as well as information concerning the drug's chemical nature, mode of action, side effects, dosage forms, cost, and literature pertinent to its clinical use.

Theodore (1978)[97] analyses the Clearinghouse for Occupational Safety and Health Information in the technical information centre for the National Institute for Occupational Safety and Health (NIOSH). The Clearinghouse supports information services at 6 locations and the information user needs survey is the first stage of an evaluation research project which will provide continual feedback on required services and resources. Questionnaires will be analysed for total sample response then stratified by location and re-analysed to make site comparisons.

Krishan Kumar (1982)[98] Describes the term, `health sciences' in place of word 'medicine'. That is why; medical librarians are being called as

'health sciences librarians'. Other terms being employed are 'health sciences libraries' and health sciences librarianship' the term 'user' refers to the user of the library/information center/documentation centre and its resources. Users are individuals. In designing an information system, users are identified and classified into types of users; the concept behind a 'types of users' does not refer to a 'group or class of persons' in the present context but means a set of particular information needs. Information needs refer to individual needs of users regarding information, which should be satisfied by the specific information system used by him.

Brown (1985)[99] Biotechnologies as well as companies with a library/information center or even partially dedicated information professional are a distinct minority. This situation occurs even in well-funded biotechnology companies with considerable research and development activity. In some cases, a local university library performs online searching and fulfills document requests on demand. For the most part, information handling is a haphazard and unorganized activity. Exceptions to this situation may be found in the established pharmaceutical and chemical firms becoming involved in biotechnology, most of which have information centers/libraries and information specialists thoroughly integrated into their research, development, marketing, and regulatory affairs efforts.

Lebedeva and Soboleva (1985)[100] says large libraries of the USSR have gained considerable experience in determining the information requirements of their users. Discusses the experience gained in this field by the Siberian Department of the USSR Academy of Sciences which is

responsible for the implementation of 24 complex research programmes. Describes the methods used to study the information requirements of users, which include interviews with leading scientists and analyses of research programmes prepared by the USSR Academy of Sciences. Determination of the information requirements of users is an important task, the results of which are used to select items to be included into an in-house information retrieval system; in addition, the knowledge of information requirements enables information scientists to prepare effective strategies used in on-line searching.

Strother, Lancaster, and Gardiner (1986)[101] surveyed five hundred randomly selected dentists in Louisiana and determined the nature and types of information sought by dentists.

Saracevic (1988)[102] has outlined the use of microfiche in medical library and information centres in Egypt, Indonesia, Mexico and Columbia an disclosed that microfiche based biomedical information sources were more effective at low-cost to the information user community.

Greenes (1989)[103] describes in his study that health care applications must serve a variety of purposes, including support of the individual clinician, patient education, facility performance monitoring, research, and medical training. Individuals will have different interests, perspectives, and needs, as well as unique interface preferences, for example, voice /pen /mouse /keyboard, text /graphics, visual layout or style.

Premsmit (1990)[104] studied the information needs of academic medical scientist at Chulalongkorn University in Bangkok, Thailand and identified three types of information needs (i) identifying up-to-date information, (ii) obtaining relevant studies, and (iii) developing research topics.

Ward (1990)[105] has described the vast range and quantities of information required and produced throughout the drug research, development and marketing life cycle. It is evident that the pharmaceutical industry is an information intensive industry.

Thomas and Howard (1991)[106] have studied utility of the video disc technology in health science libraries and found that there was a need to develop and to provide video disk technology based services to the user community in the health science libraries.

Curtis Weller and Hurd (1993)[107] investigated information needs including use of major bibliographic tools by medical, pharmacy, nursing and science faculty at the University of Illinois at Chicago and assessed the impact of availability of locally mounted databases. They also identified the need for promotional material, which acts as a baseline for subsequent studies.

Kumar (1993)[108] has examined the impact of modern technologies on medical science libraries in India and found problems in adopting the modern technologies such as:

- insufficient funds,
- lack of adequate trained staff,

- inservice training,
- initiative on the part of library professional,
- support from the authorities,
- interest on the part of the readers, and
- poor telecommunication system.

Rothstein (1993)[109] stated that the medical librarian should provide the highest level of service, ensuring access to information, protecting confidentiality, and avoiding conflicts of interest. Sometimes there is a conflict between institutional goals and the impartial provision of information.

Brown, and Williamson, (1993)[110] realize it is essential for pharmacists to not maintain, but to continually update their knowledge base to be prepared for the future. State of the art review by **Wilson (1994)**[111] describes the needs of users of chemical information online databases. Accuracy, comparability, completeness, consistency, and timeliness of the information are high on the list of desiderate of these users. The properties of compounds, including stereochemistry, 3D structure information, economic information, toxicity, and environmental behaviour, must be made more searchable. He stresses user friendliness of the services is of a high priority.

Lundeen, Tenopir, and Wermager (1994)[112] studied the information needs of Hawaii's rural health care practitioners and their methods of accessing through interviews and mailed questionnaires and identified the barriers to information access.

The management philosophy of the academic (pharma) Information Services finds parallels and emulative models in the so-called and complexity theories, quantum mechanics, information and field theories.

Wheatley (1994)[113] mention the following analogous relationships between five aspects of the new sciences and those of the organizational transformation at the Academic Information Service:

- The relationship between creativity at the edge of chaos, and organizational creativity and innovation.
- The relationship between quantum mechanics and client-centered teams.
- The relationship between the creative energy of information and management information systems.
- The relationship between chaos theory and the organization's values and culture.

Martin and Lanier (1995)[114] with their limited experience providing access to full-text journals through various state and regional cooperative agreements found Full-text electronic journals were becoming available in the field of biomedical sciences. As medical education moved off campus to clinical clerkship locations early in the medical curriculum, students did not have ready access to library materials. Although students had access to Medical databases, they want access to electronic full-text journal articles.

The information needs of physicians and biomedical scientists in India has been studied by **Schwartz (1995)**[115] through focus group sessions conducted at All India Institute of Medical Sciences, New Delhi and the Tata Memorial Cancer Centre/Cancer Research Institute, Bombay. Family physicians used colleagues most often as information sources, followed by journals and books stated by **Verhoeven, Boerma, and Jong (1995).**[116]

The change agents have an important role in fostering the adoption of innovations. **Rogers (1995)**[117] has said that the typical sequence for the change agents role looks like as follows:

- Develop the need for change,
- Establish an information –exchange relationship with the client,
- Diagnose the problems of the client,
- Create intent to change in the client,
- Translate intent into action,
- Stabilize adoption and prevent discontinuances, and
- Move toward a terminal relationship (client self-sufficiency).

Llerena (1995)[118] reviewed the literature sources used in 461 consecutive problem-oriented questions submitted during 1993 to a Drug Information Centre. Commonly used medical and clinical pharmacology Journals, together with standard textbooks, provided the necessary information to solve more than 50% of drug information requests. Most

questions could be answered by including the complementary use of the question/answer database DRUGLINE.

Lalitha (1995)[119] Describes a comparative study of the information seeking behaviour of medical and engineering personnel at 5 libraries in Thiruvananthapuram, India. Students, teachers, practitioners and research workers in both fields were surveyed. The findings of the survey are summarized and implications for libraries are discussed. Neither professional group seemed to have completely understood the complex nature of their information needs or their information sources. User education for medical and engineering personnel is clearly needed.

Felkey (1997)[120] suggested that self-medication must be accompanied by appropriate health information. These ideas are elaborated in a 1994 document from the European Commission, which stressed that community pharmacists have a key responsibility in providing information to the public about nonprescription products and the circumstances under which a physician should be consulted. This function of pharmacists is substantiated by their central role in the distribution of medicines, along with their availability to patients. To help community pharmacists to provide especially tailored drug information, an appropriate training is required. New information technologies offer a wide range of possibilities. These technologies seem especially appropriate for drug information because community pharmacies are geographically dispersed and because the type of information to be supplied needs frequent updating and benefits from interactivity.

Davis (1997)[121] outlines a health and safety management system that encompasses all of the work environments in a pharmaceutical company, including the laboratory, manufacturing, sales, and cooperate forces. It discusses information flow and integration to address physical, biological and chemical hazards present.

Carla (1998)[122] stated that the accessibility and delivery of health care information, has socioeconomic impacts of the health care environment on information delivery, aspects of telemedicine, the human genome project, medical terminology, the patient medical record and many other health issues that impact both the way in which one provide health information. We were not only using the vocabulary specific to librarianship in our presentations to describe our research findings and programs, but also terms used by the medical profession. This shared vocabulary between professions is essential to efficient and accurate communication and is one factor that makes special librarians special.

On the use of Information, **Roxanne Missingham (1999)**[123] points out that scientists concentrates on their 'finding skills', the translation of searching techniques from a database environment to the Internet, and changes in scholarly publication. There are very important issues in scientists' information needs and information that are critical to understanding how electronic information can be utilized effectively.

The concepts of interaction and interactivity presented in different theoretical models of human- computer interaction and information searching

behaviour has been explored by **Beaulieu (2000)**[124] and related these to information retrieval research.

Popoola (2000)[125] analyzed information needs services of the consumers in Nigeria and found that there was a significant relationship between the levels of education of the health consumers and sources of information used. Books /report, medical laboratories, film houses and medical library /records office were rarely used for searching pertinent information on health care services.

Hodnette (2000)[126] study explores the impact of the implementation of a computerized Hospital Information System (HIS) on there to-for-profit acute care hospitals. Using qualitative methods, including semi-structured interviews, observations, and a user satisfaction survey instrument, the study reveals that perceptions of the HIS can be having a significant impact on the employees in different areas of the facility. Comparing the perceptions of clinical, non-clinical, administrative and information services staff revealed subtle differences in their perceptions of the HIS. An overall evaluation of the HIS was sought and users rated their expectations of accuracy.

Murray (2000)[127] study investigated the implementation of a workflow system in health information management. In health information management, workflow systems are used to automate the flow of medical records and other processes requiring access to the patient information contained in those records. Workflow is an emerging technology. The research methodology employed a multiple case study in which workflow

implementation was accessed in real world settings. Six theoretical propositions defined the scope of the study and provided the framework for data collection and data presentation. These propositions address the multiple phenomena identified as having a major impact on the implementation of workflow technologies. The goal of the research is to provide information to healthcare organizations to assist them in the successful implementation of the powerful new paradigm of workflow technology.

Moahi (2001)[128] in his study explored the information behavior of health care planners, managers and administrators in Botswana. The study considered the following: the tasks and roles of the managers, planners and administrators, information requirements for those tasks, what motivates information seeking, the sources and channels, the problems and barriers managers faced in information seeking, how information is used, and finally, how the *information behavior impacts the design of a national health information system.*

The study identified a problem in the information flow within the health sector; the information sources and channels most used are informal and interpersonal, although there is room for formal information systems. The tasks that the managers and planners carry out were identified as well as the requisite information needs and the constraints that they face in getting the information. The study has also shown that information seeking is hampered to a large extent by lack of a formalized information management function to ensure that information required by planners is available in the form needed and when needed.

Chen, (2001)[129] analysis that the acquired knowledge of usage patterns can aid the design of an advanced online help system that provides situational learning and customized help, depending on the context the user is in. This study provides a background for further analysis of user behaviour on the web, which has been recognized as the key to the success of electronic commerce.

Ronald Regan (2003)[130] has studied the health information system created for the purpose of assisting the commission, legislature and other agencies and organizations in the state's efforts in collecting, analyzing and dissemination health information to assist. Applicability of health Information System was described. Data needs was explored.

2.1.4 Pharmaceutical Information User Studies

Hoff (1983)[131] stated that effective use of drugs depends on the accurate and comprehensive communication and understanding of information about them.

Osiobe (1985)[132] says that the use of medical journals take predominance over other sources as the first source of learning about advances in medicine and new drugs among health professionals studies have also shown that most physicians become aware of new therapeutic advances via the journal literature also stated that "collection from the world literature is an essential backup to the company's activities" **Kenny (1977).**[133]

Vittal Ras (1987)[134] Analyses information seeking behaviour of scientists (heterogeneous users) of the National Institute of Nutrition, Hyderabad by a questionnaire method. Information was sought with regard to their information seeking behaviour with reference to current information sources, documentary and non-documentary. Emphasis was laid on non-documentary channels: formal and informal, such as mass media, flow of communication among scientific groups and gatekeeper scientists. Concludes that non-scientists' information seeking behaviour is mostly non-documentary and non-formal in character.

Smith (1988)[135] Marketing is a process leading to a mutually beneficial exchange between two parties defined by the *American Marketing Association* as "Marketing is the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods and services to create exchanges that satisfy individuals and organizational objectives"

Pharmacy is an information intensive profession that demands effective use of technology to manage an ever-expanding body of knowledge. "Information anxiety" is described as the frustration of being inundated by an overabundance of information sources while being unable to navigate them to find specific needed information **[Greenes and Shortcliffe (1990)].**[136] In order to minimize information anxiety, pharmacists must be competent in the use of computers to collects, store, retrieve, send drug and patient related data for both administrative and clinical purposes. The importance of information technology to the future of pharmacy practice has been well described in the literature. **[Felkey, and Barker, (1995)]**[137]**.** Information technology has

always influenced pharmacy practice, but now with the availability of inexpensive yet powerful computers, and rapid communication via the Internet and other networks, this technology will exert an increasing force in changing roles for pharmacists. An understanding of some information technology principles may help practitioners avoid being "buried alive" in the streams of data that now permeate the health care setting. **[Cook, Meade, and Fink (1996)].**[138]

The evidence-based practice paradigm increases clinician information needs and to meet these needs, clinicians require rapid access to resources that provide content that is relevant, valid, and can be obtained with minimal effort. **[Sackett (1997)].**[139] Ideal information resources are electronic, portable, connected to valid databases and servant to the user. **[Smith (1996)**[140] **and Ely et al. (1999)].**[141] While pharmacists may not need to be experts in information systems, they do need sophisticated end-user knowledge of technologies that are available and applicable to research and clinical practice. These technologies include personal and network computing; hospital information systems; personal digital assistants; the Internet; word processing; and presentation, statistical analysis and database management software. Those practitioners who do not incorporate some of these tools into their practice will undoubtedly have difficulty keeping up with the clinical information necessary for evidence-based practice. As other health care professionals continue to incorporate available technology into their practices, pharmacists need to advance at least as quickly as possible to ensure that they are at the forefront of this movement. Only by doing so they

will be able to ensure that they continue to be the drug expert in the health care team. The development of automated drug dispensing, clinical monitoring and clinical decision support systems is evolving rapidly and these developments challenge the pharmacist to maintain an evidence-based and patient-centered role in the healthcare system.

Pharmacists need to manage information too. Recent trends showed an increasing number of new prescriptions, medications – especially, the tailor made prescription (pharmacogenomics) is being taken up in a big way. Under the "new economy" and the "new health insurance" regime, lot many changes are expected in the field of pharmacy management for example in maintaining the patient records. Pharmacists need to update themselves about every medication, its therapeutics usage, side effects, drug interactions and dosage forms. Pharmacy informatics is a tool to improve communication between pharmacist, medical practitioner and patient. It helps in streamlining the work of hospital / clinical / retail pharmacist **[James et. al (2001)[142], Micheal et al. (2001)[143], Robert et al. (1997)][144].** It involves the development of relational data base systems with comprehensive patient data, complete drug interaction database, drug alert, etc. This will allow the pharmacist to spend quality time in patient-counselling.

Currently, the data management related to pharmacy is being manipulated by a non-pharmacy expert, causing severe errors and bottlenecks in the effective development of pharmacy informatics tools. Hence, the field is currently limited to the creation of databases and retrieving information. The effective interpretation of the trends observed in the data of pharmacy

practice was not yet accomplished – i.e. the available data is not being converted to information and further to knowledge.

A pharmacist with information technology background (a pharmacy informaticist) would be able to derive viable new conclusions that could change the field of pharmacy practice because the necessary information to define new laws of pharmacy practice are all a part and parcel of the pharmacy informatics.

Lim, and Palvia (2001)[145] investigated the many interorganisational systems are increasingly using Electronic Data Interchange (EDI) to support the strategic supply chain by way of delivering and processing business documents. In a vendor customer relationship, EDI can provide many benefits to both organizations; one such benefit is improved customer service. Examines the impact of EDI on customer service, when the vendor and customer utilize EDI in their distribution operations. The primary ***hypothesis is that EDI improves customer service.*** Also tests secondary hypotheses dealing with specific components of customer service. Data was obtained by administering survey instruments to purchasing managers of firms in the automobile and pharmaceutical industries. The results provide strong support for most of the hypotheses. Specifically, EDI contributes to the following customer service components: order cycle time, product availability, distribution flexibility, distribution information and distribution malfunction. An impact on post sale product support was not discernible from the data. Some industry influences were observed on the impact of EDI

2.1.5 Information System Design

Timely, relevant information must be the goal of information services says **Russell (1983).**[146] Librarians and information officers need to distinguish and meet the information requirements of administrators, research workers, advisers, educators and regulatory/diagnostic staff. Each of these groups has a distinct need for information and marketing approach must be taken to the provision of information services in the most appropriate format.

Mohanty, Kulkarni, and Nayak (1989)[147] have attempted for the design of a Decision Support System (DSS) for library administration. They found that DSS facilities:

- to identify the needs of the users;
- the allocation of funds needed for multi-objective programme method;
- database development for providing computer based information services to the user community; and
- to manage the routine administrative and operational functions.

Pare (1989)[148] through his study provides a deeper understanding of clinical information systems implementation. The research reported in this paper focuses on building a theory of dynamic nature of the implementation process, that is, how and why of what happened.

Pascual Segura and Bernabe Zea (1991)[149]. Explain the needs of new users of patent information and some ways of getting them stressed.

Summarises the most common information problems and their recommended solutions using existing or future on-line CD-ROM products. Shows how different kind of users would face different problems, and consequently would need different on-line CD-ROM services. A recommended order of subscription to CD-ROM patent data bases is given. Advises searching CD-ROM first. If necessary searching on-line but benefitting from the experience gained previously with CD-ROM.

Gouveiea (1993)[150] suggested the current state of pharmacy information systems is described, and a future direction for information management efforts is proposed. Today's pharmacy information systems are supported by excellent hardware and software. Systems are less expensive, more responsive, more flexible, and smaller than ever before. However, we have been ineffective at tailoring information systems to the pharmaceutical – care needs of patients. Instead, there is overemphasis on traditional requirements to support unit does drug distribution. Deficiencies of current systems include a lack of real time interfaces among, hospital systems redundancy of effort by users.

Ineffective capturing, reporting, and integration of data; and a cumbersome order –entry process. A vast amount of information is circulation; the challenges are to focus on those clinical and financial data on which patient-care decisions can be based. Each hospitals pharmacy should develop a clinical information management strategy. Existing systems should be examined determine which functions are not being used and which could be enhanced without major software modifications; enhancement might

include routine entry of drug allergy information so that all orders may screened and the of networks and interfaces to provide medication profile s to physicians and nurses.

Kumar (1993)[151] suggested the health professionals and practitioners engaged in the task of improving the health standards of the Indian people needs an efficient information support system so that they can deliver the health care services effectively. This support becomes much more relevant in the national efforts to achieve the goal **'Health for All by 2000'** recent developments in computers and telecommunication technologies have revolutionsied the modes and methods of information storage and retrieval. Now information cannot only be stored, retrieved, communicated and broadcast electronically in enormous quantities and at phenomenal speed, but it can also be rearranged, selected, marshaled and transformed.

Mahesh and Ghosh (1998)[152] have stated in their study that the libraries are willing to buy and made use of indigenous databases. Further revealed that all the libraries are self sufficient with in house development databases.

Sharma (1998)[153] pointed out the significant role of health science libraries in directing future scientific communication. Health science libraries, health information professional and librarians are going to play a key role in directing future scientific communication, influencing the information policies of management, responding to the needs of the end-user, besides

exerting a significant influence on distance learning, continuing medical education and providing programs to train health professionals.

Rama (1998)[154] states that medical informatics is an interdisciplinary field. Medical Informatics articles will be found in the literature of various disciplines including library and information science publications. The purpose of this study was to provide an objectively ranked list of journals. This study also used citation analysis to identify the most frequently cited journals relevant to library and information science.

Mirta Millares (1998)[155] analysed medical and pharmacy databases, the types of information provided, and the pros and cons of the specific databases. Also, the use of MEDLINE, suggestions for search strategies and other MEDLARS databases is reviewed, and easy–to-understand examples are provided. A review of the use and utility of the Internet, including the World Wide Web, as a source for drug information is a useful addition, as is the device on determining whether an Internet site offers quality information or not. The Peer-review process, research design, evaluation of the clinical literature, imperative areas of drug information retrieval, research, and dissemination of information are also reviewed.

Whereas **John Malley and Ken Grffin (1999)**[156] described the current state of affair of health care information systems.. An integrated healthcare information system would provide numerous benefits to the industry.

Gordon, Daniel Benjamin (1999)[157] has explained his research work to make strategic decisions. The objective of this work has been to (1)

investigate a methodology, based on the balanced scorecard, which helps managers define and use important management information; (2) develop an information system that makes this information accessible and which provides a context for integrated decision making. (3) Investigate the impacts of the prototype system on the healthcare organization.

Bajer et al. (2001)[158] in their technical product information found on the Web sites of most pharmaceutical companies is limited to the package insert. In an effort to give health care professionals expanded access to technical information, the Professional Product Information department at Roche Laboratories Inc created a Web site that provides a broad variety of drug information, including on-label and off-label information on products marketed by Roche. The Professional Product Information Web site is designed to provide clinicians with the same information that would otherwise be provided in response to a telephone call or a written inquiry. The development of this Web site required the collaboration of several departments including law, regulatory affairs, technology management, business information systems, and media design management. This article reviews the many considerations in creating such a Web site.

John Ray (2001)[159] explained and recommended state-of-the-art informatic system design based on the concepts and principles of health promotion and the Trans theoretical model. It was designed so that it would be capable of improving the health status of individuals and reducing the economic burden on organizations and the society as a whole. The discussion covers the void that this framework and design fills as well as the implications

of and potential for building and deploying advanced informatic systems on a population-wide basis. The implications of this research for health practitioners, consumers, healthcare providers and agents of care, information systems developers, researchers, and policy makers are reviewed in the discussion.

Little and Millington (2001)[160] reported the potential library users electronically. Berlex Laboratories, Inc., a US affiliate of pharmaceutical company Schering AG, Germany, is headquartered in Montville, New Jersey, where its Library and Information Center (LInC) supports business and therapeutic units at our two New Jersey sites, Wayne and Montville, and the library staff consists of two professional information managers and two paraprofessionals. In addition to supporting all reference and literature searches and FDA/Regulatory activities, they also process all invoices, support global licensing for US materials, and produce two daily newsletters highlighting issues of importance to Berlex's drug development activities.

Berlex's business and therapeutic units require intensive information and the LInC must respond quickly and efficiently to their requests. In order to do this, the decision was taken to produce a dynamic LInC presence on the Berlex corporate intranet and, in the summer of 1999, the staff worked to develop a Web site that would allow end users to shop the LInC for the information that they would need on a day-to-day basis. By using portal-type technology, the result was a portal: an individual portal containing information personalized to the end-user.

2.2 INFERENCES AND FURTHER DIRECTIONS

Review of literature reveals different set of user information needs study through survey methods. Mostly information users and needs of engineers **[Disch (1976)]**[19], social scientist **[Mintzberg (1979)]**[22], **[Stone (1982)]**[30], Historians **[Karisiddappa et al. (1989)]**[34] and Academic researchers **[Ellis (1993)]**[43] are the topic of research studies but according to **[Martin (1976)]**[20] there are few studies attempted to discover why users turn to the library and what effect library use has **[Allen (1997)]**[21] points out that many users studies have been performed but they have been for the most part piecemeal in approach and there has been little or no attempt to integrated their results into a more complete understanding of the information dissemination process. Many have suggested to consider more communicational variables and methods as resources for new approaches to the study of user behaviour. Over the lost four decades information seeking has gained increasing prominence as an issue for user-centered information seeking research **[Kuhlthau (1993)]**[42].

Many have studied the information use pattern at industrial level **[Marie (1980)]**[70], **[MaGuire and Kench (1971)]**[69] **[Sasikala (1994)]**[82] **[Anderson and Latiolais (1965)]**[92], **Francke (1965)**[93] **Parker (1965)**[94], **Pellegrino (1965)**[95] **and Wittrup (1965)**[96] have published much data concerning use and need for adequate drug information in the treatment and care of patients. Many others have studied medical user information needs in smaller scale.

Pharmacy is an information intensive profession that demands effective use of technology to manage an ever expanding body of knowledge "information anxiety" is described as the frustration of being in undated by an over abundance of information source while being unable to navigate them to find specific needed information **[Greenes and Shortcliffe (1990)]**[136].

Currently, the data management related to pharmacy is being manipulated by a non-pharmacy experts, casing sever errors and bottlesness in the effective development of pharmacy informatics tools **[James et al. (2001)]**[142]. Many researchers have contributed that might for the understanding of pharmaceutical information scenario in the world, but a few Indian researchers have contributed a little information to the field. Also there where not many studies pertaining to information need, awareness and use pattern of persons involved in particularly pharmaceutical practice. There was not much attempt was made to develop an integrated information system for pharmaceutical sector. Hence there exists a scope for this present study of information system for pharmaceutical industry a case study on its design and development.

The survey of literature presented in this chapter has helped the researchers to draw a detailed outline for the present research topic so as not to repeat the domain where researchers have already dealt with. Consequently, the survey revealed the significant of pharmaceutical industrial information system and justified the selection of the present topic as a research work.

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Chapter 3

Methodology

CHAPTER 3

METHODOLOGY

3.1 SAMPLE-DATA - SOURCES

This chapter presents the methodology adopted in the study of information use and use behaviour of the pharmaceutical industry personnel. The methodology consists of (a) selection of samples, from among the users of the library and information services offered by the pharmaceutical organizations in and around Chennai city, Tamil Nadu State, India. (b) The data gathered from the pharmaceutical industrial personnel, by adopting questionnaires, devised for the purpose of the study, and (c) the secondary documents from which ideas have been assembled for the thesis and the literature survey for corroborative materials. In the selections of samples (firms) for the questionnaire survey the Directory of the Tamil Nadu Pharmaceutical Manufacturer's Association (2001-02) has been consulted.[1] Further the firms annual reports have been consulted to identify the top persons who involved in R& D as well as management activities of the firms chosen.

The discussion in this chapter is in four parts. The first three speaks of the three above and the fourth provides a description and justification for the use of various statistical techniques in analysis of the collected data.

3.2 SELECTION OF POPULATION

The target population for the study has been drawn from the listed Pharmaceutical Organizations from the Directory of the Tamil Nadu Pharmaceutical Manufacture's Association (2001-02). The firms listed in the directory have been grouped as per their activities and shown in Table 3.1.

Table 3.1:Types of Pharmaceutical Organisations

Sl.No	Types of Organisations	Nos.
1.	Bulk Drugs Manufacturers	8
2.	Sterile Manufacturers.	5
3.	R& D Centre / Laboratories	5
4.	Intermediates	4
5.	Pharmacy Practice	2
6.	Drug Testing Laboratories	29
7.	Herbal Products Manufacturers	5
8.	Formulations Manufacturers	117
9.	Others	12
	Total	**187**

The pharmaceutical organizations functioning in and around Chennai are about 187, out of 187, 175 have been chosen as target population for this study. 12 organizations where not considered since they are only associated organisations rather than main functionaries of pharmaceutical industry setup at Chennai.

Normally, a few top most persons in any of the pharmaceutical firms are the managers of those firms who involved in research and development as well as management activities. They are the people who use information for their R&D as well as management activities, hence it was discussed to choose, one top person from each organisation as one of the respondents of our target population for submission of the survey questionnaire. Hence one hundred seventy five top managers were identified through Organisation's Annual Reports for study of their information use and use behaviour pattern.

3.3 RESEARCH QUESTIONNAIRE

This study was designed to discover the information use and use behaviour of pharmaceutical industry personnel in and around Chennai city. Also to offer suggestions if any for the improvement of the existing library and information setup, as well as to suggest a model for research and development oriented Pharmaceutical Industry Information System (PIS).

After reviewing the literature and considering many aspects of the problems under study a questionnaire was constructed with different variables identified to suit the different areas of study.

The questionnaire consists of four broad areas of user related variables. They are: (a) Organization /Company profile with eight categories within, (b) Personnel data with ten categories, (c) Information Awareness /Channels with different ten categories and (d) Organisation /Company Library Facilities with fifteen categories.

Under each categories of questions, there where many sub questions, each amounting to a single variable. From the thirty six categories of information in the four sections of the questionnaire, there were measures made on 240 variables, with a distribution of 35, 15, 83and 107 variables in sections a, b, c, and d of the questionnaire respectively (Table 3.2). Section (a) deals with Organisation profile and section (b) inquiries into the personal data of the respondent, hence small number of variables. Section (c) inquiries into the information awareness, channels and information utilization pattern by the users and section (d) of the questionnaire deals with the organisation library facilities in detail.

Table 3.2: Categories of Information / Variables

Sl.No.	Categories	No. of Variables
	A. Organisation / Company Profile	
1.	Establishment	1
2.	Type of Organisation / Company	8
3.	Products / Activities	10
4.	Staff structure	7
5.	Membership in Professional Bodies	5
6.	Library Facilities – Status	4
		35
	B. Personal Data	
1.	Individual Profile	6
2.	Publications	9
		15

Sl.No.	Categories	No. of Variables
	C. Information Awareness / Channels	
1.	Internal channel of Information	8
2.	External Channel of Information	17
3.	Habit of Information collection	3
4.	Media for Information Collection	5
5.	Information satisfaction Rate	4
6.	Non-collection of Information	4
7.	Barriers to Information	7
8.	Frequency of Information Collection	4
9.	Storage form of Information	4
10.	Purpose of Information seeking	14
11.	Hours of Reading	4
12.	Time of Reading / Referring	6
13.	Place of Internet facility	3
		83
	D. Organisation / Company Library Facilities	
1.	Availability of Library	1
2.	Library collection	14
3.	Library Automation	9
4.	Library Network Facility	4
5.	Library Computer based Services	6
6.	Special Databases Services	12
7.	Conventional library services	11
8.	Company Library – Utility pattern	5
9.	Company Library – Use Purpose	9
10.	Company Library collection – Satisfaction	5
11.	Company library collection – subject	9
12.	Special Information Centres	3

Sl.No.	Categories	No. of Variables
13.	New Information Services – Need	13
14.	Information Fee	1
15.	Company Library – Overall rating	5
		107

The data gathered using the questionnaire have been of various types, mostly interval and ratio types in certain section, however, rank order data and **Likert** scales have been generated. There have also been qualitative, verbal data from the questionnaire; numerical data have been generated to facilitate quantitative analysis.

Reliability of the data collected against different set of variables from 123 respondents was worked out using SPSS package. The same population's data were given SPSS treatment but are not sufficient enough to give reliable scale test. However the researcher is confident on the data provided by the pharma industries. Hence the reliability test not applied since the data collected are more valid.

3.4 CHARACTERISTICS OF RESPONDENTS

In the analyses reported in the next chapter, a number of variables have been used to analyse the type of organisations and their products /activities to which the respondents belong. Also about 15 variables are used to describe the respondents characteristics in section (b) of the questionnaire, some of the variables are not used in any of the analyses nor are they described elsewhere. It is better they are described briefly here, so that the respondents'

characteristics are made known to the readers. Categorical information has already been dealt within the foregoing pages. Among the pharmaceutical organisations to which the respondents belong, there are 120 drug testing laboratories /centres, 113 formulation manufacturers, 20 R and D centre /laboratories, 9 herbal products manufacturers, 8 bulk drug manufacturers, 6 sterile manufacturers, 4 intermediates, and 2 pharmacy practice. The organisations involve in any one or any are more then one activities mentioned above (Table 3.3).

Table 3.3: Organisation Activities

Sl.No	Description	No. of Respondents
1	Bulk drugs manufacture	8
2	Intermediates	4
3	Herbal Products Mfrs.	9
4	Sterile Mfrs.	6
5	Pharmacy Practice	2
6	Formulation Mfrs.	113
7	R&D centre/ lab	20
8	Drug testing Lab/Centre	120

The responded organisations involved in production of various end products are shown in Table 3.4.

Table 3.4: Products/ Activities of Respondents

S.No	Description	No. of Respondents
1	Tablets	113
2	Capsules	93
3	Creams	12
4	Injectables	16
5	Liquid orals	90
6	Cosmetics	7
7	Ointments	19
8	Eye drops/ Lotions	2
9	Food Products	7

Among them, there are 113 organisations manufactures tablets, 93 capsules, 90 liquids orals, 19 ointments, 16 injectables, 12 creams, 7[illegible] in food products, and cosmetics, 2 eye drops/lotions. The respondents come from various fields of specializations, with 63 in pharmaceuticals,17 in quality control ,15 in drug manufacturing, 14 in formulations, 11 in analytical chemistry, and 3 in biotechnology (Table 3.5).

Table 3.5: Field of Specialisations

Sl.no	Description	Frequency
1	Manufacturing	15
2	Analytical Chemistry	11
3	Formulations	14
4	Quality control	17
5	Pharmaceuticals	63
6	Biotechnology	3
	Total	123

Among the respondents, there are 76 managers, 16 production managers, 10 managing directors, 9 chemical analysts, 6 each of General Manager and deputy manager. This statistics clearly substantiate our target population of 175 managers with different capacities of several pharma industries (Table 3.6).

Table 3.6: Respondents Designation

Sl.No	Designation	Frequency
1.	Managing Director	10
2.	General Managers	6
3.	Deputy Managers	6
4.	Managers	76
5.	Production Manager	16
6.	Analysts	9
	Total	123

Table 3.7 shows the age-wise distribution of respondents (123). Majority of the respondents fall in the age group of 31-40 years (58 respondent 47.2%), and 41-50years (38 respondents 30.9%), because of the rich experience they may fall in managers, production managers and others involve in marketing. About 18 respondents are of the age group 51-60 years and 3 are above 60 years, they are all holding the positions as GM, MD, president etc., but the statistics shows about 6 persons belongs to 22 to 30 years of Age, probably they may be involving in chemical analysis, Manufacturing activities. Out of 123 respondents 27 are having more than 20 years of experience, 17 are 16 –20 years experience, 37 are 11to 15 years, 36 are 6 to 10 years and a small number of 6 (4.9%) are of 5 years experience. The above data proves that majority of our respondents are well experienced in pharma activities (Table 3.8).

Table 3.7: Age wise distribution of respondents

S.No	Age	Frequency	Percent
1	20 to 30 Yrs.	6	4.9
2	31 to 40 Yrs.	58	47.2
3	41 to 50 Yrs.	38	30.9
4	51 to 60 Yrs.	18	14.6
5	60 + Yrs.	3	2.4
	Total	123	100.0

Table 3.8: Respondents Experience

Sl.No	Year of Experience	Frequency	Percent
1	1 to 5 Yrs.	6	4.9
2	6 to 10 Yrs.	36	29.3
3	11 to 15 Yrs.	37	30.1
4	16 to 20 Yrs.	17	13.8
5	20 + Yrs.	27	22.0
	Total	123	100.0

3.5 STATISTICAL PROCEDURES FOR DATA ANALYSIS

Librarian and information scientists have eagerly adopted the use of quantitative methodology wherever possible. They are convinced that the use of statistics confers respectability **[Palmer (1991a)]**[2]. The present study also takes on the view that quantitative analysis could provide for a spectrum of perspectives, which would otherwise have been lost, on the behaviour of people using library and information services for their pharmaceutical activities.

Various statistical tools / techniques are resorted to in this study because the study has generated a large volume of data, which cannot be analysed with a piecemeal approach.

As **[Judith Palmer (1991a)]**[2] has indicated that the librarians and information scientists have eagerly adopted the use of quantitative methodology wherever possible because, as **[Skelton (1971)]**[3] has indicated:

> ***Data on user requirements must be in quantitative form, and must be representatitive of substantial areas of user behaviour***

The present study is no exception and hence uses quantitative methodology to analyse information awareness, use pattern and behaviour of pharma industry personal.

The study follows the logic of **[Paisley (1968)]**[4] that:

> ***We cannot interpret data on information needs and uses without recognizing that the scientists/ technologists stands at the center of many systems that touch every aspect of his work.***

The statistical tools like Weighted Arithmetic Mean (WAM), Cluster Analysis, correlation techniques, frequency / percentage, dendrogram, proximity matrix etc. have been used in the anal ysis of data collected through questionnaire survey and the description of a few of them is provided in the following paragraphs.

3.5.1 Weighted Arithmatic Mean (WAM)

This method is used for the cases where the relative importance is not the same. When this is so, Weighted Arithmetic Mean is computed. The term 'weight' stands for the relative importance of the different items.

The formula to compute Weighted Arithmetic Mean is follows.

$$X_w = \Sigma WX / \Sigma W$$

Where X_w. represents the Weighted Arithmetic Mean

X – represents the variable values

W- represents the weights attached to the variable values.

The following are the steps to compute Weighted Arithmetic Mean:

- Multiply the weights by the variable X and obtain the total ΣWX
- Divide this total by the sum of the Weights ΣW

3.5.2 Cluster analysis

The multivariate statistical procedures have been used intensively in the social sciences research for the past two decades. Generally, these procedures are useful to reduce large data into Dimensions, Solutions, Extractions and Clusters. It is a classificatory procedure.

The Cluster Analysis is one such method, which has been adopted in this study to minimize the data into groups/clusters. Cluster Analysis groups highly similar entities and create homogeneous groups of variables. To quote **Aldenderfer and Blastified (1984)**[5], "a clustering method is a multivariate statistical procedure that starts with a data set containing information about a sample of entities and attempts to reorganize these entities into relatively homogeneous groups".

Similarity measures

The "Closeness" or "similarity" can be measured on the nature of the variables (Discrete, Continuous, Binary) or scales or measurement (Nominal, Ordinal, Internal, Ratio). Basically the variables/cases are clustered on the basis of correlation coefficient or like measures of association or Euclidean distance. Though there are various similarity measures available, Euclidean distance in generally preferred for cluster analysis.

Types of clustering techniques

Aldenderfer (1984)[5] has identified the following seven clustering methods.

- Hierarchical agglomerative
- Hierarchical divisive
- Interactive partitioning
- Density search
- Factor analytic

- Clumping
- Graph theoretic

The hierarchical procedure is further grouped into single linkage method, complete linkage method, average linkage method and wards method.

The hierarchical method of clustering is dominant among the above stated seven clustering methods in terms of frequency of its applications and hence used in this study.

Each method stars with the calculation of similarities or distances of each individual to all other individuals. Groups with similar entities are merged together and seen in a single group. These groupings may be presented in the form of a **'dendrogram'.**

3.5.3 Correlation

There are different methods for studying bivariate and multivariate samples. For bivariate samples we usually apply the following methods

- Cross tabulation
- Spearman's coefficient of correlation
- Karl Pearson's coefficient of correlation

For multivariate samples, the commonly used methods are:

Coefficient of multiple correlation

Coefficient of partial correlation

Under cross tabulation method, we cross classify each variable in two or more sub categories from where we try to find out the nature of relationship is established which may either by symmetrical, reciprocal or asymmetrical. Symmetrical relationship, is established when two variables vary together but neither of the variable is due to the other. In reciprocal relationship, two variables mutually influence each other. Asymmetrical relationship is possible, when one variable is responsible for another. With the help of a two- way table such inter-relationship between the variables is shown. But finding out correlation under this method, for obvious deficiency in analysis, as has already been explained, *is seldom used and other methods of statistical correlation are preferred more. Moreover, ordinal data cannot be successfully cross-tabulated.

By determining the coefficient of correlation, we measure the closeness of association between two variables. Implicit or ordinal bivariate data is particularly analysed with the help of Spearman's coefficient of correlation. When information on variables is not available in the form of explicit numerical values, to ease the problem of computing correlation coefficient, we assign rankings to the items in each of the two variables and thereafter study the closeness of association, using this formula

$$r_s = 1 \; \frac{6 \; \Sigma d^2}{n(n^2 - 1)}$$

3.5.4 Dendrogram

Plot dendrogram graphs.

Syntax

H = dendrogram (Z)

H = dendrogram (Z, p)

[H, T] = dendrogram (…)

[H, T, perm] = dendrogram (…)

[…] = dendrogram (…, ‘colorthreshold’, t)

[….] = dendrogram (…, ‘orientation’, ‘orient’)

[….] = dendrogram (…, ‘labels’, S)

Description

H = dendrogram (Z) generates a dendrogram plot of the hierarchical, binary cluster tree represented by Z. Z is an (m-1)-by=3 matrix, generated by the linkage function, where m is the number of objects in the original data set. The output, H is a vector of handles to the lines in the dendrogram.

A dendrogram consists of many U-shaped lines connecting objects in a hierarchical tree. The height of each U represents the distance between the two objects being connected.

H = dendrogram (Z, p) generates a dendrogram with only the top p nodes. By default, dendrogram uses 30 as the value of p. When there are

more than 30 initial nodes, a dendrogram may look crowded. To display every node, set p = 0.

[H, T] = dendrogram (...) generates a dendrogram and returns T, a vector of length m that contains the leaf node number for each object in the original data set. T is useful when p is less than the total number of objects, so some leaf nodes in the display correspond to multiple objects. For example, to find out which objects are contained in leaf node k of the dendrogram, use find (T = = k). When there are fewer than p objects in the original data, all objects are displayed in the dendrogram. In this case, T is the identity map, i.e., T = (1:m) where each node contains only a single object.

[H, T, perm] = dendrogram (...) generates a dendrogram and returns the permutation vector of the node labels of the leaves of the dendrogram. Perm is ordered from left to right on a horizontal dendrogram and bottom to top for a vertical dendrogram.

[...] = dendrogram (..., 'colorthreshold', t) assigns a unique color to each group of nodes in the dendrogram where the linkage is less than the threshold t. t is a value in the interval [0, max(Z(:, 3))]. Setting t to the string 'default' is the same as t = .7(max (Z(:,3))). 0 is the same as not specifying 'colorthreshold'. The value max(Z (:, 3)) treats the entire tree as one group and colors it all one color.

[...] = dendrogram (..., 'orientation', 'orient') orients the dendrogram within the figure window[6]. The options for 'orient' are

'top'	Top to bottom (default)
'bottom'	Bottom to top
'left'	Left to right
'right'	Right to left

3.5.5 Proximity Matrix

A proximity is a measurement of the similarity or dissimilarity, broadly defined, of a pair of objects. If measured for all pairs of objects in a set, the proximities are represented by an object-by-object proximity matrix[7], such as the 'distance matrix' as stated below:

A proximity is thought of as a ***similarity*** if the larger the value for a pair of objects, the closer or more alike we think they are. Examples of similarities are co-occurrences, interactions, statistical correlations and associations, social relations, and reciprocals of distances. A proximity is a dissimilarity if the smaller the value for a pair of objects, the closer or more alike. Examples are distances, differences and reciprocals of similarities.

Proximities are normally symmetric, so that the proximity of object ***a*** to object ***b*** is the same as the proximity of object ***b*** to object ***a***. For example, the distance from Chennai to Tirupati is 150 kms, and the distance from Tirupati to Chennai is also 150 kms. However, in the case of one-way streets, it is possible for distances to be non-symmetric.

Proximities Matrix are in four formats as, illustrated below:

Square matrix	**Upper Triangular**	**Lower Triangular**	**Proximity List**
0 x x x x	x x x x	x	2 1 x
x 0 x x x	x x x	x x	3 1 x
x x 0 x x	x x	x x x	3 2 x
x x x 0 x	x	x x x x	4 2 x
x x x x 0			1 3 x

In all formats, the diagonal elements are disregarded; however, a value should be entered for each diagonal element when using Square Matrix format.

The Upper Triangular and Lower Triangular formats treat the proximity matrix as symmetric.

The Square Matrix format can be symmetric or asymmetric. There are 4 types as follows:

Sum proximities $P_{ij} = p_{ij} + p_{ji}$

Average proximity $p_{ij} = \frac{1}{2}(p_{ij} + p_{ji})$

Minimum proximity $p_{ij} = \min(p_{ij}, p_{ji})$

Maximum proximity $p_{ij} = \max(p_{ij}, p_{ji})$

Proximity List format can be symmetric or asymmetric. The first 2 values on each line are case numbers (in any order), and the third value is the

proximity for that pair of cases. The list does not have to be exhaustive, as Clustan Graphics will assume that any omitted proximities correspond to maximum dissimilarity, or minimum similarity. This type of format is useful for large, sparse matrices – for example, telephone calling traffic where the traffic between nodes is heavily localized.

3.5.6 Likert Scale

Likert Scale consists of a series of statements all of which are related to a person's attitude towards a single concept. Two types of statements appear on Likert scales. The first type includes statements whose endorsement indicates a favourable attitude towards the concept of interest which are called "favourable statements". The second type includes statements whose endorsement indicates an unfavourable attitude towards the concepts of interest which are called "unfavourable statements".

Likert Scale measures the extent to which a person agrees or disagrees with the statement. The following are the steps involved in measuring an item using Likert Scale:

i. Statements must be written that favourable or unfavourable with respect to the attitude statement.

ii. Create asset of potential scale item. Typical responses options are strongly disagree, disagree, not sure, agree and strongly agree. A numerical value is assigned to each response option as follows:

1. Strongly disagree
2. Disagree
3. Not sure
4. Agree
5. Strongly agree

iii. Judges (respondents) are called into rate the items. Notice that, the judges do not tell what they believe but they judge how favourable each statement is with respect to the construct of interest.

iv. The next step is to calculate the intercorrelations between the responses made to each statement and then the total score is computed.

v. Each statement whose correlation with the total score is not statistically significant is eliminated. The fact that each statement must be correlated with the total score if it is to be included on the final form of the scale is referred to as Likert criterion of internal consistency.

vi. The final form of the scale is prepared.

3.5.7 Frequency Table

A frequency table is a way of summarizing a set of data. It is a record of low often each value (or set of values) of the variables in question occurs. It may be enhanced by the addition of percentages that fall into each category.

A frequency table is used to summarise categorical, nominal and ordinal data. It may also be used to summarise continuous data once the data set has been divided up into sensible groups.

When we have more than one categorical variable in our data set , a frequency table is sometimes called a contingency table because the figures found in the rows are contingent upon (dependent upon) those found in the columns.

3.5.8 Pie Chart

A pie chart is a way of summarizing a set of categorical data. It is a circle which is divided into segments. Each segment represents a particular category. The area of each segment is proportional to the number of cases in that category.

3.5.9 Bar Chart

A bar chart is a way of summarizing a set of categorical data. It is often used in exploratory data analysis to illustrate the major features of the distribution of the data in a convenient form. It displays the data using a number of rectangles, of the same width, each of which represents a particular category. The length (and hence area) of each rectangle is proportional to the number of cases in the category it represents, for example, age group, religious affiliation.

Bar charts are used to summarise nominal or ordinal data.

Bart charts can be displayed horizontally or vertically and they are usually drawn with a gap between the bars (rectangles).

3.5.10 Range

The range of a sample (or a data set) is a measure of the spread or the dispersion of the observations. It is the difference between the largest and the smallest observed value of some quantitative characteristic and is very easy to calculate.

A great deal of information is ignored when computing the range since only the largest and the smallest data values are considered; the remaining data are ignored.

The range value of a data set is greatly influenced by the presence of just one unusually large or small value in the sample (outlier).

Examples

1. The range of 65, 73, 89, 56, 73, 52, 47 is 89 –47 = 42.

2. If the highest score in a 1st year statistics exam was 98 and the lowest 48, then the range would be 98-48 = 50.

3.5.11 Percentile

Percentiles are values that divide a sample of data into one hundred groups containing (as far as possible) equal numbers of observations. For example, 30% of the data values lie below the 30th percentile[8].

3.6 REFERENCES

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Chapter 4

Study and Analysis of Library use Behaviour of Pharma Industry in Chennai

CHAPTER 4

STUDY AND ANALYSIS OF LIBRARY USE BEHAVIOUR OF PHARMA INDUSTRY IN CHENNAI

4.1 INTRODUCTION

In this chapter, the data collected from the sample respondents with regard to the information needs, information awareness, information seeking and information use pattern has been analysed. In analysing the different facets of information behaviour a variety of statistical tools have been employed. For every facet of the study more than one statistical tool has been applied, to fulfil the stated objectives and to test the hypotheses.

4.2 TARGET POPULATION

As described in chapter 3 Methodology, a total number of 175 managers of Pharmaceutical Industries have been identified as our target population for study. Pre-designed questionnaire was submitted to 10 numbers of our target population of various categories as a pilot study. The filled in questionnaires were checked with at most care, wherever necessary telephonic explanation was called from the respondents. Then, the questionnaire was revised with required input. The finalized questionnaire was submitted to all the 175 persons by means of personal distribution as well

as by post. After a few remainders, 123 persons have responded out of 175, and the response rate is 70.28%. This is illustrated in Table 4.1 and Fig.4.1.

Table 4.1 : Distribution of Questionnaire and Responses

S.No.	Questionnaire Distributed	Response Received	Percentage (%)
1.	175	123	70.28

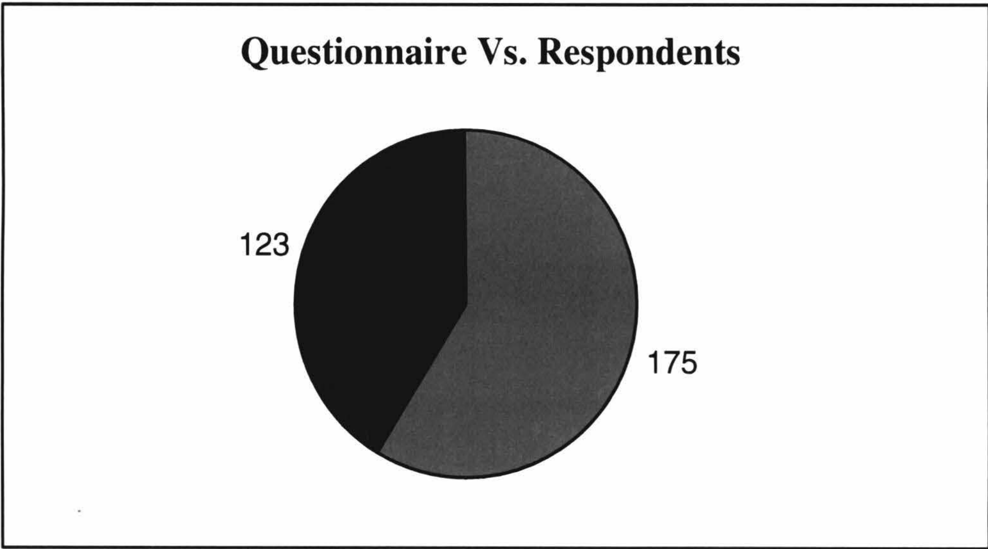


Fig 4.1: Distribution of Questionnaire and Response

4.3 ORGANISATION/COMPANY PROFILE

4.3.1 Year of establishment

Majority of respondents have not answered for the variable year of establishment, but from the answered (about 30), it is clear that M/s.Amurtanjan Ltd., Chennai is the one started in the year 1893 and the Sanmar, Chennai is the latest (year 2002). In general most of the surveyed

companies would have been established after independence and having long innings of service.

4.3.2 Types of organization / company

A question was asked to findout what type of organisation the respondents belong. They have identified the type of pharmaceutical organization they belong and the same is shown in Table 4.2 and Fig. 4.2.

Table 4.2: Types of Organisation

S.No	Code	Description	No. of Respondents	Percentage
1	BDM	Bulk drugs manufacture	8	6.5
2	INT	Intermediates	4	3.3
3	HPM	Herbal Products Mfrs.	9	7.3
4	SM	Sterile Mfrs.	6	4.9
5	PP	Pharmacy Practice	2	1.6
6	FM	Formulation Mfrs.	113	91.9
7	RDL	R&D centre/ lab	20	16.3
8	DTL	Drug testing Lab/Centre	120	97.6

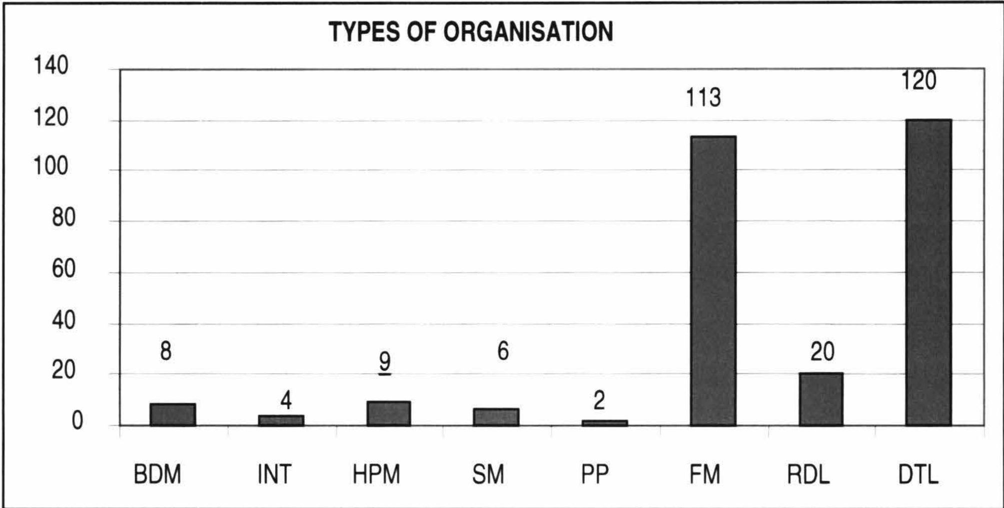


Fig 4.2 : Types of organization

From the Table 4.2 and Fig 4.2 it is clear that the majority of the respondents are drug testing lab / centre (120, 97.6%); followed by formulation manufactures (113,91.9%). ***R&D Centres / Laboratories*** are the significant respondents (20) with 16.3%. Other types are of small in number. Category-wise distribution of respondents clearly shows that more than 50% of the organisations involve in more than one type of activities, thus majority of them are heterogeneous type of organisations. Hence, they may be in need of varied type of information to suit their activities. Though only 8 are bulk drug manufactures they are important as for as the society health is concerned.

Today the government as well as public are moving towards herbal based medicinal system, in the survey we found about 9 respondents belong the herbal products manufacturers accounting for 7.3%. Certaininly they may look forward to have information related to herbal related subjects including government regulations, policies etc.

4.3.3 Products/Activities

The types of the products manufactured by the respondent's companies were identified and the same is shown in Table 4.3 & Figure 4.3. Most of the organizations are concentrating on Tablets (113,91.9%). It is followed by Capsules (93,75.6%) and Liquid orals (90,73.2%).

Table 4.3 Products/Activities

S.No	Code	Description	No. of Respondents	Percentage
1	TAB	Tablets	113	91.9
2	CAP	Capsules	93	75.6
3	CMS	Creams	12	9.8
4	INJ	Injectables	16	13.0
5	LOS	Liquid orals	90	73.2
6	COS	Cosmetics	7	5.7
7	OINT	Ointments	19	15.4
8	EDL	Eye drops/ Lotions	2	1.6
9	FP	Food Products	7	5.7

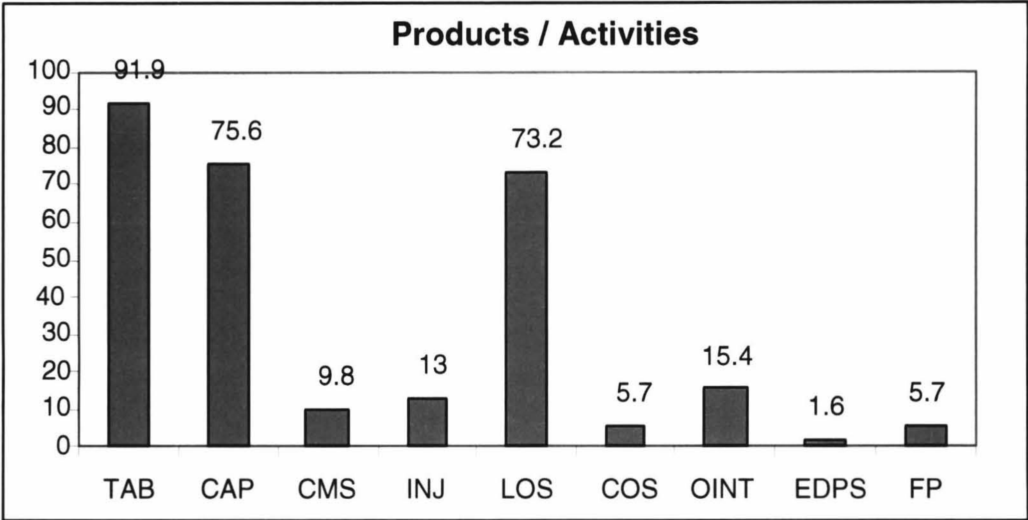


Fig 4.3 : Products/Activities

Other products like creams, cosmetics, ointments etc., are for specific purposes for a specific group of people in the society, hence less number of companies involve in production of them, where as the tablets, capsules and liquid orals are needed do meet the total society medical requirement, hence they are manufactured by majority of pharma companies. From the table, it is understood that the companies are involved in manufacturing about nine different products/processes, which shows, they may in need of different information for different works. Hence the information required is based on their products and purposes.

4.3.4 Staff structure

Table 4.4 : Staff structure at company

S.No.	Category of staff	No. of company	No. of staff
1	R & D Staff	40	122
2	Administrative Staff	75	333
3	Technical Staff	70	1735
4	Managerial Staff	68	229
5	Library Staff	15	16
6	Trainees	65	491
7	Others	75	1972

The respondents (123) have provided data about their staff structure which is presented in Table 4.4. There are seven categories of staff, ranging from R&D staff to trainees. Out of 123 companies, 40 have employed highly qualified R&D Personal (122), 229 managerial staff employed at 68 companies; 1735 technical staff at 70; 333 Administrative staff at 75; about 491 trainees are allowed to take training at 65 companies. 75 companies have placed about 1972 workers, they are temporary in nature.

Interestingly, there are 16 library professionals employed by 15 companies, who have well organised libraries (see Table 4.8). As far as staff structure is concerned many companies have employed good number of R&D, Technical and managerial staff with high qualifications. Since the

pharmaceutical companies are facing stiff technical as well as marketing competition world over.

4.3.5 Company Membership in Professional Bodies

All the respondents are member of any one of the professional bodies. Some of the them are members of more than one professional bodies. The Table 4.5 & Fig.4.4 shows that nearly 111 respondents (90.2%) are members of the IPA. 106 respondents (86.2%) are members of PMA, followed by IDMA (51, 41.5%). Nine respondents are members of OPDI (73%).

Table 4.5 : Company Membership in Professional Bodies

S.No	Code	Name of the professional bodies	No. of Respondents	Percentage
1	IPA	Indian Pharmaceutical Association	111	90.2
2	IDMA	Indian Drug Manufacturer's Association	51	41.5
3	OPPI	Organization of pharmaceutical producers of India	9	7.3
4	PMA (TN)	Pharmaceutical Manufacturer's Association of TN.	106	86.2

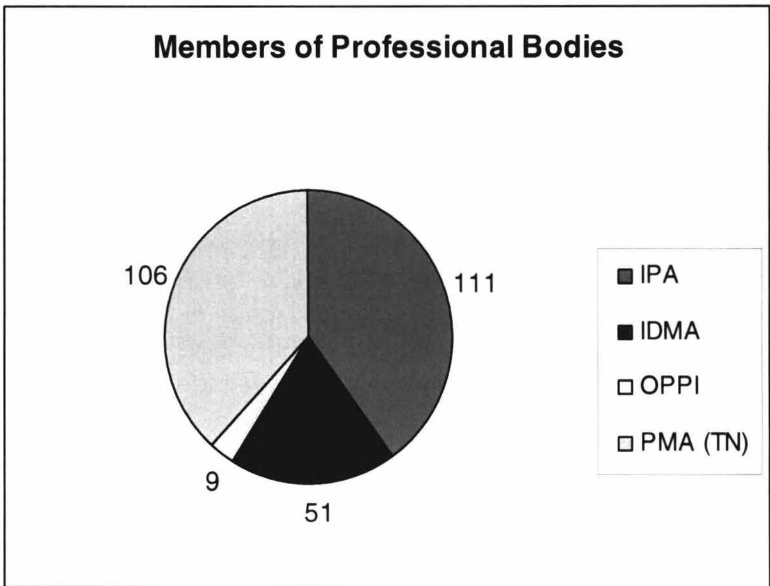


Fig 4.4 Members of Professional bodies

The companies have shown greater interest to become members of IPA and PMA because they are the bodies at central and state level to help the companies in providing trade and government information. In general the data shows all the pharma comparies are aware of the professional bodies and the benefit they get out of them.

Apart from company's become members of professionals bodies, the manager of those companies are also showed interest in becoming individual members of several pharmacy related associations. This is evident from data derived out of the question raised to know whether they are also members of any association or not. The following Table 4.6 clearly indicates that more than 41.5% of the managers (51) are members of IPA, followed by 20.3% (25) are members of PMA.

Table 4.6 : Individual Membership in Professional Bodies

Sl.No.	Professional bodies	No. of Individuals	Percent (%)
1.	IPA - Indian pharmaceutical Association	51	41.5
2.	PMA - Pharmaceutical manufacturer's association	25	20.3
3.	IDMA - Indian Drug manufactures Association	6	4.9
4.	IPGA - Indian Pharmaceutical Graduate Association	3	2.4
5.	Other Associations	5	4.0

The other associations attracted a smaller number of individuals (IDMA 4.9%, IPGA 2.4%) as their members. A few others have become members of a special type of subject oriented professional bodies such as fellow of Institutions of Chemists, Calcutta. All India Bio-tech Association, New Delhi, International Society for Thrombiosis and Haemotasis, USA, and International Society for Fitrinolysis and Proteolysis, Belgium. But from the Table 4.6 it is clear that about 33 managers out of 123 respondents have not indicated their membership in any professional bodies. But a significant number of respondents (90 out of 123) have had their membership in professional bodies. Many of them have also registered in more than on bodies. Their activities are an indication that they are much in need of search for the required information through professional bodies besides their own

company library. IPA and IDMA seems to be the prominent professional associations helping the Pharma Industry.

4.3.6 Company library facilities

Table 4.7 and Fig.4.5 shows the existence of library concept in Pharmaceutical Industries. From the table it is seen that 84.6% (104) of Pharmaceutical Industries have their library concept in their organization. Nearly 15.4% (19) industries do not have a library concept at all (see Table 4.8 also). However it is noticed that some of them are having personal collection to meet their requirements. This is justified by the data presented in Table 4.8.

Table 4.7 : Library facilities-status

S.No.	Description	Frequency	Percent
1	Yes	104	84.6
2	No	19	15.4
	Total	123	100.0

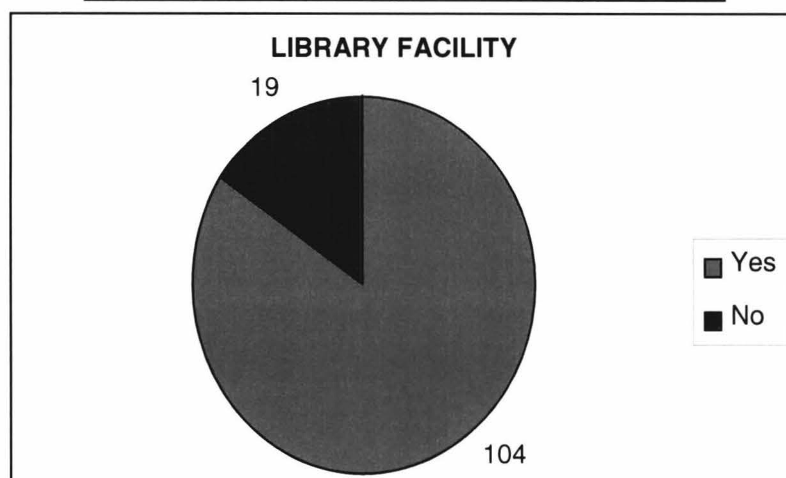


Fig. 4.5 : Library facility - status

Table 4.8 : Type of company library facilities

Sl. No.	Code	Description	Frequency	Percent (%)
1	SOL	Separate Organised Library	15	12.3
2	IHC	Individual Holding	5	4.0
3	SBC	Store of Books on Cupboards	84	68.3
4	NLC	No Library Concept	19	15.4
	Total		123	100

From the data presented in the Table 4.8 it is clear that only 15(12.3%) well established companies have separate organised library. But majority of the pharmaceutical industries 84 (68.3%) have library concept, storing their document collection in cupboards which is being managed by non-library professionals. Hence, they are not having the organised libraries, but they involve in information collection process by approaching other sources. This set-up really required a centralised information facility to support the pharmaceutical industries. 4% of the manager have their individual collections at their company itself. 19 companies (15.4%) have expressed that they do not have library concept at all, but they do collect required information by other means and want more information for their activities.

4.4 INDIVIDUAL RESPONDENT PROFILE

4.4.1 Designation

Table 4.9 : Designationwise Respondents

Sl.No	Code	Description	Frequency	Percentage
1.	MD	Managing Director	10	8.1
2.	GM	General Managers	6	4.9
3.	DM	Deputy Managers	6	4.9
4.	MS	Managers	76	61.8
5.	PRT	Production Manager	16	13.0
6.	ALS	Analysts	9	7.3
		Total	123	100.00

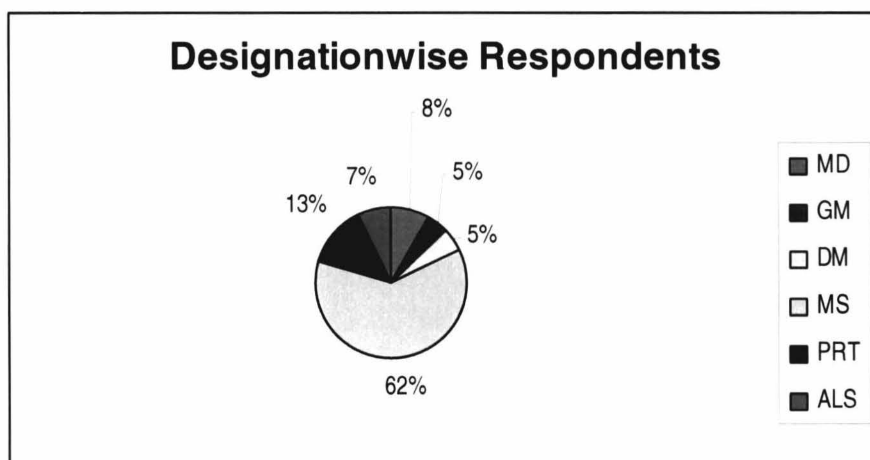


Fig 4.6 : Designation wise Respondents

As seen in Table 4.4, the pharmaceutical companies have employed well qualified and experienced (Table 4.12) R&D, managerial, technical and other categories of staff members for effective management of the company.

It is further clear from the Table 4.9 that among the respondents, there are 76 managers, 16 production managers, 10 managing directors, 9 chemical analysts, 6 each of general managers and deputy managers who are responsible for the company being dynamic. This statistics clearly substantiate our target population of 175 managers with different capacities, of several pharma industries.

4.4.2 Division of work with qualification

From the data collected from 123 respondents (all managerial level persons, refer sec. 4.2) it is evident that the managerial level persons possesses combination of qualifications ranging from M.Pharm., M.Sc., M.B.A. to Ph.D. with several years of experiences (See Table 4.12). They are all are working in any one of the divisions like R&D division, analytical and testing laboratory, marketing division and general administration.

4.4.3 Field of Specialisations

The field of specification of managers are different for each one as per their activities and the positions they hold. It is presented in Table 4.10. About 63 managers (52%) are specialised in pharmaceuticals preparations followed by quality control specialists (17, 14%), formulation activities attracted about 14 manager (11%), the others specialized in analytical and manufacturing techniques. The important aspect to note is the current area of interest Bio-Technology which attached 3 managers (2%). In general, the respondents are evenly distributed in all the related areas of specialisation with respect to pharmaceutical industries.

Table 4.10 : Field of Specialisations of Respondents

Sl.no	Code	Description	Frequency	Percentage
1	MFR	Manufacturing	15	12
2	AC	Analytical Chemistry	11	9
3	FML	Formulations	14	11
4	QC	Quality control	17	14
5	PHS	Pharmaceuticals	63	52
6	BIOT	Biotechnology	3	2
		Total	**123**	**100**

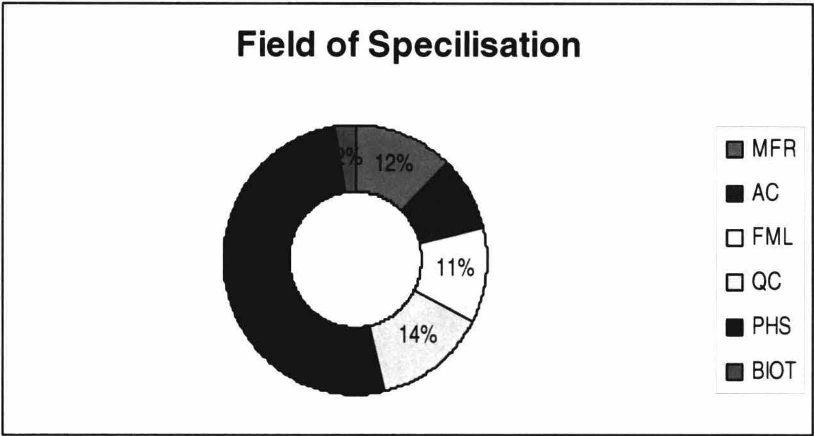


Fig. 4.7 : Field of Specialisations of Respondents

4.4.4 Age of Respondents

Majority of the respondents fall in the age group of 31-40 years (58 respondents), and 41-50years (38 respondents), because of the rich experience they may fall in the categories like managers, production managers and others involve in marketing.

About 18 respondents are of the age group 51-60 years and 3 are above 60 years, they may holding the positions as GM, MD, Chairman etc., but the statistics shows about 6 persons belongs to 22 to 30 years of age probably they are the team involving in laboratory works, analysis, production etc.

Table 4.11 : Agewise Respondents

S.No	Age	Frequency	Percent
1	20 - 30 Yrs.	6	4.9
2	31 - 40 Yrs.	58	47.2
3	41 - 50 Yrs.	38	30.9
4	51 - 60 Yrs.	18	14.6
5	60 years above	3	2.4
	Total	123	100.0

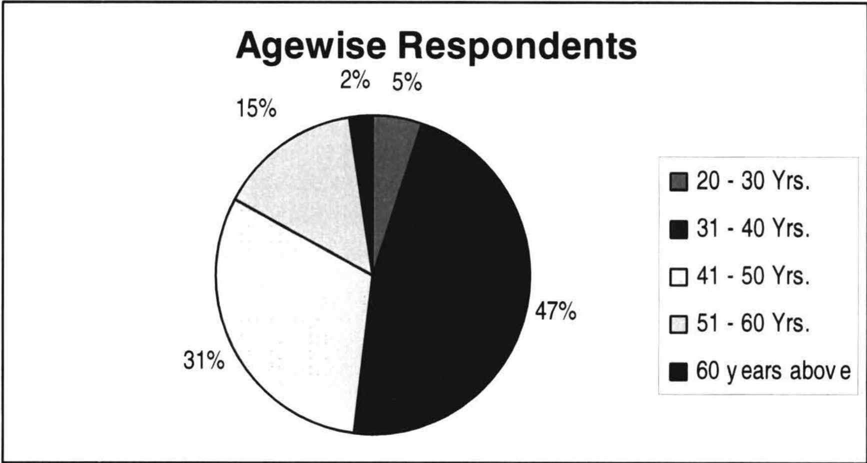


Fig. 4.8 : Respondents age

4.4.5 Experience of respondents

Table 4.12 : Experience of the Respondents

S.No	No. of Years of Experience	Frequency	Percent
1	1 to 5 Yrs.	6	4.9
2	6 to 10 Yrs.	36	29.3
3	11 to 15 Yrs.	37	30.1
4	16 to 20 Yrs.	17	13.8
5	20 and above	27	22.0
	Total	**123**	**100.0**

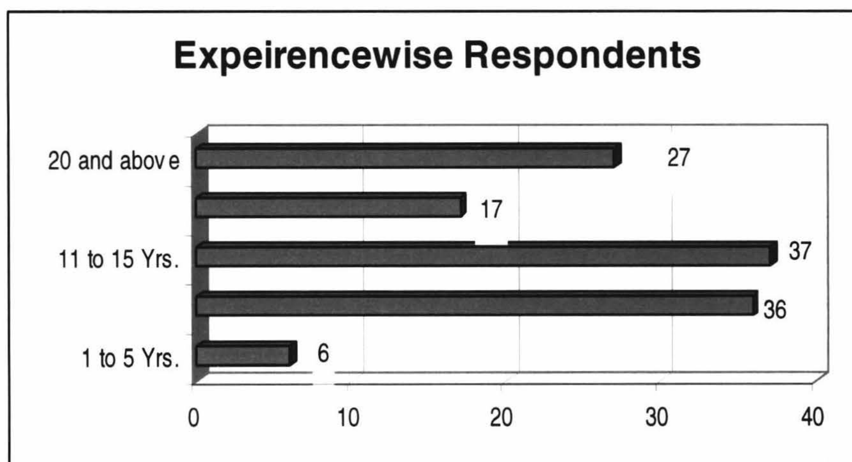


Fig 4.9 Experience of respondents

Out of the 123 respondent mangers, 27 are having more than 20 years of experience, 17 are 16 –20 years experience, 37 are 11to 15 years, 36 are 6 to 10 years and a small number of 6 (4.9%) are of 5 years experience. The

above data proves that majority of our respondents are well experienced pharma personalities. They are holding responsible positions in their companies. They certainly require specific information for their specialized nature of works.

4.4.6 Publications/Research

The respondents involve in study and research and further publishing / presenting papers in journals, conferences, seminars, etc. They also involve in writing books, preparing reports, filing patents besides guiding students. These activities are all been well presented in Table 4.13.

Table 4.13 : Publications of respondents

Publications		Range/ No. of respondents					Total
Code	Description	1-5	6-10	11-15	16-20	20+	
RP	Research papers	25	10	0	1	0	36
SC	Short Communs.	46	5	0	1	0	52
BCP	Books/Conf. proceedings	32	13	5	7	7	64
REP	Reports	35	16	9	6	0	66
PAT	Patents	27	0	0	1	0	29

Research publications are one of the indicators of characteristics of respondents. The managers interviewed (questionnaire) appear to be prolific writers as well, with several publications to their credit. 36 of them have more

than 10 research papers, while 10 of the 36 have about 6-10 papers, other 25 of the 36 have 1-5 papers. One have published more than 20 papers. 46 of the respondents have to their credit 1-5 short communications, while other 5 have 6-10, when only one have published about 20 short communications.

Books / Conference proceeding seems to be the standing work out of their study and research. 40 respondents published books/conference proceeding upto 10, 32 of them have published about 5, 5 in the range of 11-15, 7 in 16-20 and 7 respondents published more than 20 books / conference proceedings.

Fifteen of the respondents have to their credit 11-20 reports. Some 16 respondents have a range of 6-10 reports and 30 respondents to their credit published 1-5 reports. As for patents taken, 27 respondent have 1-5 patents to their credits. Since pharmaceutical industries involve more in research, reporting results and filing patents, about 28 managers took patents, and 66 managers prepared technical reports.

Regarding research activities of the managers as per the Table 4.14, some 5 of the respondents are very eminent doctoral guides, guided a range of 1-5 doctoral students. Sixty four of the respondents who responded to the questionnaire survey have provided 1-5 consultancy, the other six did 6-10.

115 respondents have attended workshops/training in the range of 1-5(65), 6-10(43), 11-15(2) and 16-20(5). 70 respondents have attended 1-5

Table 4.14 : Research activities of respondents

Research activities		Range/ No. of respondents					Total
Code	Description	1-5	6-10	11-15	16-20	20+	
PDG	Ph.D guided	5	0	0	0	0	5
CD	Consultancy work	64	6	0	0	0	70
WTIA	WS/Training attended	65	43	2	5	0	115
CA	Conf. Attended	70	34	6	3	0	115

115 respondents have attended workshops/training in the range of 1-5(65), 6-10(43), 11-15(2) and 16-20(5). 70 respondents have attended 1-5 conferences, while 34 attended 6-10, 6 attended 11-15 and 3 attended 16-20.

The above statistics shows that the managers who are respondents are all greatly involving in study and research work, also participating in Conferences, Seminars, Workshops and Training for furthering their knowledge, since personal experience and knowledge is the key internal information (Table 4.15) for their activities.

4.5 INFORMATION AWARENESS/CHANNELS

4.5.1 Internal Channels of Information

It is observed that the respondents mostly top managers of pharmaceutical companies do depended on their internal channels of

information. A question was asked to inform about the internal channels they use for information seeking and also they were asked to rank three such channels in descending order. The collected data are grouped, analysed and presented in Table 4.15. The WAM (Weighted Arithmetic Mean) for finding the rank order of such preferred internal channels of information was worked out and the same is presented in the Table 4.15.

Table 4.15 : Internal Channels of Information

S. No	Code	Description	Rank 1	Rank 2	Rank 3	WAM	RANK
1	IHLF	In-house Library Facilities	42	10	42	31.33	2
2	CIF	Company internet facility	17	31	19	22	3
3	PKE	Personal Knowledge, experience or experimentation	31	44	21	33.66	1
4	POC	Other personnel in your organisation/company	35	6	14	21.83	4
5	CMCW	Company meetings, courses, workshops, etc.	2	5	11	4.5	6
6	CRPD	Company sponsored R&D projects	3	5	1	3.33	7
7	FCRMD	Formal company reports, manuals, documents, etc.	7	12	12	9.5	5

As seen from the Table, personal knowledge, experience/ experimentation has higher WAM value (33.66) followed by in-house library facilities (31.33). Significantly a closer WAM value is worked out for 'company INTERNET facility', followed by other personnel in the company

(WAM 21.83). The other three internal channels have very low WAM value, they are company reports/manuals/documents (9.5), company meetings/courses/workshops (4.5) and company sponsored R&D projects (3.33). Hence, it is interpreted that the low WAM valued three channels are of less importance than the other four high WAM valued channels. The internal channels mostly preferred by the managers for information awareness and information seeking are list below in order of preference.

1. Personal knowledge, experience/experimentation
2. In-house library facilities
3. Company INTERNET facility
4. Other personal in the company

However, they are also showing interest in using other internal channels occasionally. From the analysis, it is observed that, experience is highly related with information seeking behaviour of pharmaceutical company managers. The INTERNET facility preferred next.

Informal sources such as personal experience, personal contacts, colleagues, in-house libraries, Internet are preferred by the respondents than formal sources. This point is ascertained by many previous researchers **Choo** and **Auster (1993)**[80], **Verhoeven, Boerma** and **Jong (1995)**[116], **Mohani (2001)**[128].

4.5.2 External non-documentary channels of information

The managers of the responded companies did seek information from several external sources of information. For the questions raised. They are using the respondents have marked the channels they use and also ranked the used channels in order of five. All the collected data were presented in Table 4.16 and Fig. 4.10 and analysed for interpretation.

Table 4.16 : Non-documentary channels of information - use

Sl.No.	Code	Description	Yes	Percentage
1	SVP	Supplier or vendor person	110	89.4
2	CCW	Conventions/conf/WS	34	27.6
3	MMNTV	Mass media/Newspaper, TV	52	42.3
4	PSIA	Professional Societies/Industrial Association	61	49.6
5	FCT	Formal Course, Training	61	49.6
6	FIDC	Formal inf. dissemination centre/lib.	35	28.5
7	UIDC	Universities/Institutions/Drug Information Centres	79	64.2

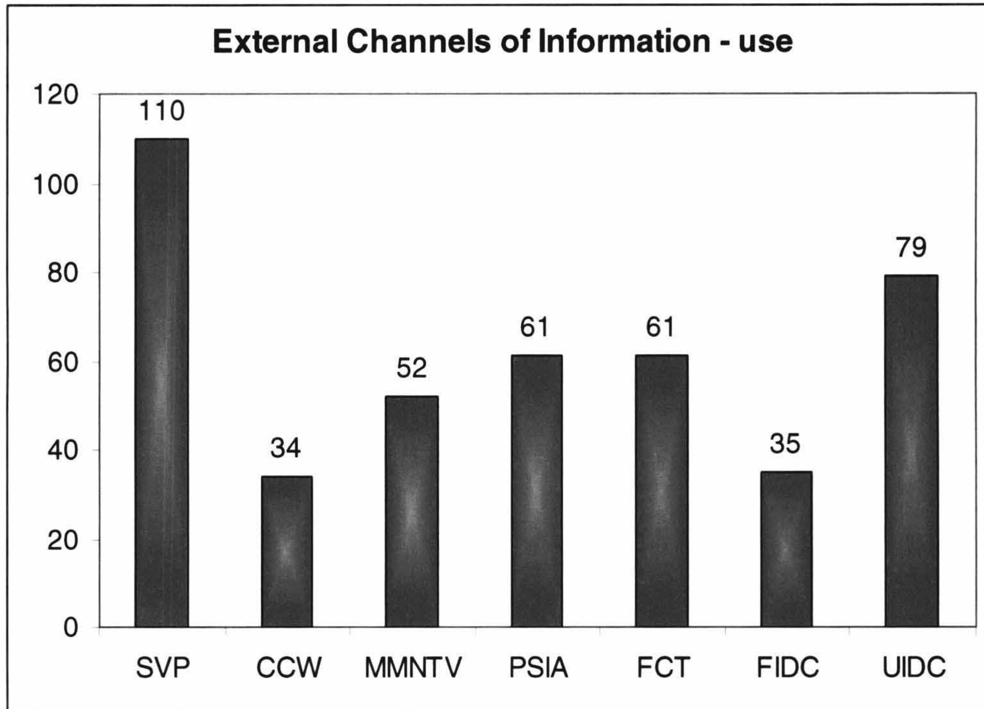


Fig. 4.10: External channels of information - use

The frequency and percentage have been worked out to find out the most preferred external non-documentary channels of information which the manager preferably using for information awareness and information seeking. From the table as well as figure, it is evident that the most preferred channel is supplier or vendor personnel (110) scoring 89.4%. The other significantly important non-documentary channels are :

Universities/Institutions/Information	79(64.2%)
Professional Societies/Associations	61 (49.6%)
Formal courses, training	61 (49.6%)
Mass media/News paper/TV	52(42.3%)

Pharmaceutical companies and individual managers have preferred to became members is pharmaceutical associations. This is clear from the above data and the same inference is supported by data is Table 4.5 & 4.6 presented elsewhere in this chapter.

The respondents, as stated earlier, were asked to rank five most important external channels. Based on their ranking WAM has been calculated and are shown in Table 4.17.

Table 4.17 : Non - documentary channels of information - Ranking

Sl. No.	Code	Description	Ranking %					Total	WAM	Rank
			1	2	3	4	5	%		
1.	SVP	Supplier/vendor	23 (18.7)	19 (15.4)	13 (10.6)	16 (13.0)	31 (25.2)	102 (82.9)	21.2	1
2	CCW	Convention/conf./WS	7 (5.7)	3 (2.4)	7 (5.7)	8 (6.5)	9 (7.3)	36 (29.3)	7.4	2
3.	MMNTV	Mass media/ newspaper/TV	1 (0.8)	2 (1.6)	1 (0.8)	0 (0)	0 (0)	4 (3.2)	0.5	7
4.	PSIA	Professional Societies/Associations	4 (3.3)	2 (1.6)	1 (0.8)	2 (1.6)	1 (0.8)	10 (8.1)	1.6	5
5.	FCT	Formal courses, Training	1 (0.8)	0 (0)	0 (0)	4 (3.3)	6 (4.9)	11 (9.0)	3.1	4
6.	FIDC	Formal Information Dissemination Centres / Libraries	0 (0)	0 (0)	0 (0)	3 (2.4)	0 (0)	3 (2.4)	0.8	6
7.	UIDIC	Unviersities/Institutions/ Drug Information Centres	3 (2.4)	2 (1.6)	6 (4.9)	5 (4.1)	2 (1.6)	18 (14.6)	3.8	3

Based on the ranks thus derived through WAM, in the Table 4.17, it is found that the five most preferred external non-documentary channels by the managers of the responded pharma companies for information awareness and seeking are listed below :

External non-documentary channels

Supplier/vendor	(21.2)
Conventions/Conf. /WS	(7.4)
Universities/Institutions / Drug Infn. Centres	(3.8)
Formal courses, Training	(3.1)
Professional Society/Associations	(1.6)

Less preference is given to the other two types of channels, i.e. mass media and institutional sources.

4.5.3 External documentary channels of Information

The respondents prefer to use documentary channels (sources) from outside their company for their information seeking. Those channels were identified and response from the managers were collected and tabulated for frequency and percentage analysis. The result is presented in Table 4.18 and Fig. 4.11.

Table 4.18 : Documentary channels of information - use

S.No	Code	Description	Yes	Percentage
1	CM	Company manual	81	65.9
2	BKS	Books	80	65.0
3	PJ	Professional Journals	74	60.2
4	AIS	Abstracting and Indexing Services	23	18.7
5	GPM	Government Publications, Manuals	46	37.4
6	PATREP	Patents / Reports	59	48.0
7	STDS	Standards / Specifications	60	48.8
8	TC	Trade Catalogue	105	85.4

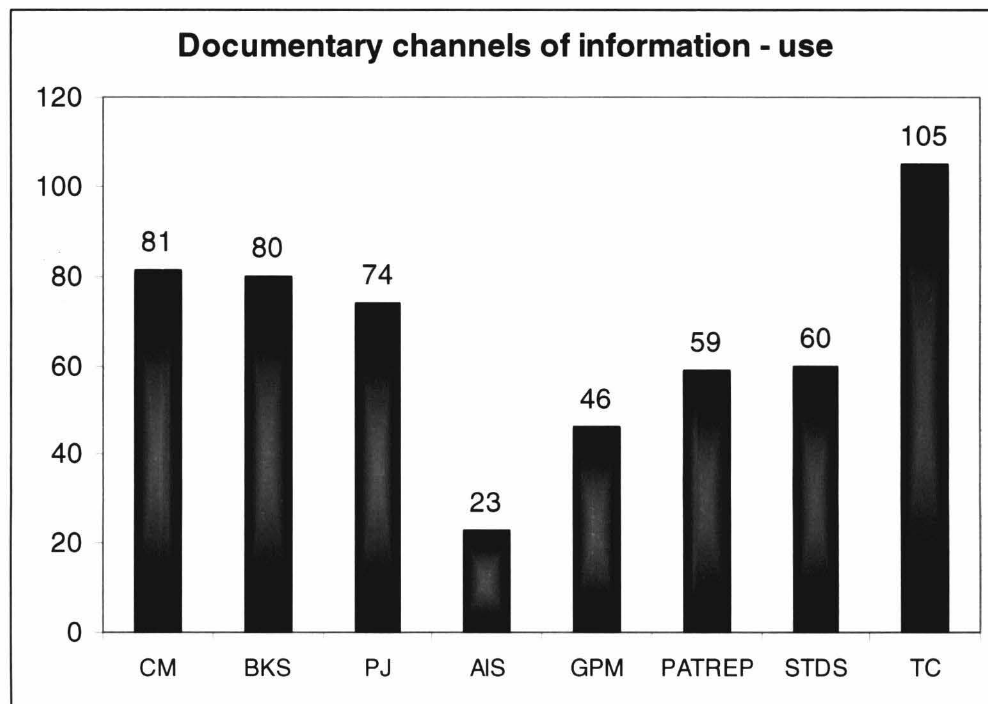


Fig. 4.11 Documentary channels of information - use

It is seen from the table, trade catalogue (85.4%) is the most preferred external documentary channel for the industry to have new technical data / information. It is followed by manuals (65.9%) and books (65%), still the traditionally preferred document source. Professional journals (60.2%) are likely chosen as documentary channel since they carry research articles which is useful for R&D work at companies. Patents/Reports (48%) and Standards / Specifications (48.8%) are the demand of 60% of the respondents probably for technical data. Govt. Publications (37.4%) and abstracting and indexing periodicals (18.7%) are the least preferred, may be because, the index services attracts charges, whereas the Govt. Publications rarely comes out. From the literature it is understood that the indexing services are mostly preferred by Scientist **[Maheswarappa and Nagappa (1990)]**[73].

Further the respondents were asked to provide their rating for the extent of their utility of external documentary sources in the order of priority of high to low of five steps. The ratings are show in Table 4.19. Based on their rating data, WAM statistics has been calculated.

Table 4.19 Documentary channels of information – ranking

Sl. No.	Code	Description	Ranking %					Total %	WAM	Rank
			1	2	3	4	5			
1	CM	Company Manual	27 (22.0)	11 (8.9)	2 (1.6)	5 (4.1)	13 (10.6)	58 (47.2)	9.3	4
2	BKS	Books	18 (14.6)	9 (7.3)	20 (16.3)	24 (19.5)	9 (7.3)	80 (65.0)	15.8	1
3	PJ	Professionals Journals	15 (72.2)	11 (8.9)	27 (22.0)	7 (5.7)	14 (11.4)	74 (60.1)	14.4	3
4	AIS	Abstracting & Indexing Services	11 (8.9)	2 (1.6)	0 (0)	5 (4.1)	5 (4.1)	23 (18.6)	4.0	5
5	GPM	Govt. Publications	4 (3.3)	17 (13.8)	8 (6.5)	7 (5.7)	10 (8.1)	46 (37.3)	9.3	4
6	PATREP	Patents/Reports	11 (8.9)	5 (4.1)	3 (2.4)	2 (1.6)	0 (0)	21 (17.0)	2.5	7
7	STDS	Standards / Specifications	5 (4.1)	3 (2.4)	2 (1.6)	0 (0)	5 (4.1)	15 (12.2)	2.8	6
8	TC	Trade catalogues	22 (17.9)	25 (20.3)	6 (4.9)	24 (19.5)	8 (6.5)	85 (69.1)	15	2

The rank order derived based on the WAM data clearly shows, the respondents have ranked the channels as per their use (Table 4.18). Mostly they prefer Books (15.8) as rank one out of eight external documentary sources for their information seeking closely followed by the trade catalogue (15), then professional journals (14.4), company manual (9.3) and Govt. Publications (9.3), Abstracts / Index services (4.0), Standard/Specifications (2.8) and Patents/Reports (2.5). The ranking of external sources is in close relation with the use pattern of the managers.

Correlations

Besides frequency, percentile and WAM, Correlation technique has also been used to find out the preferences of external channel of information by the respondents. The correlated values are provided in the Table 4.20.

Table 4.20 External channels of informations - Relationship

CASE	SVP	TC	UIDIC	LIB	CCW	BKS	JL	AIS	GPM	CM	PATREP	STDS	MMNTV	PSIA	FCT	FIDC
SVP	1.000															
TC	.681	1.000														
UIDIC	.019	.075	1.000													
LIB	.245	.149	.145	1.000												
CCW	-.058	-.001	.272	.145	1.000											
BKS	-.022	.047	.050	.141	.148	1.000										
PJ	.218	.174	.060	.020	.209	.062	1.000									
AIS	.177	.249	.410	-.047	.153	.041	.076	1.000								
GPM	.326	.547	.134	.064	.156	.174	.142	.363	1.000							
CM	.199	.429	-.072	.125	.092	.111	.159	.072	.342	1.000						
PATREP	.118	.213	.207	.188	.301	.066	.273	.067	.215	.348	1.000					
STDS	.124	-.010	.185	.312	.214	.328	.282	.086	.226	.154	.365	1.000				
MMNTV	.027	.215	.330	.165	.179	.228	.170	.297	.278	.304	.298	.449	1.000			
PSIA	.024	.181	.537	.091	.260	.039	.106	.404	.341	.200	.219	.301	.468	1.000		
FCT	.077	.043	.469	.130	.160	.039	.032	.371	.168	-.074	.350	.366	.468	.480	1.000	
FIDC	.100	.261	.320	.138	.135	.059	.004	.432	.245	.150	.224	.286	.445	.456	.600	1.000

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The data in this table clearly shows the inter-relationship between two variables (Channels). All variables agree to each of other in the function of

transferring information as external source or channels as per the preference of respondents.

4.6 INFORMATION HABIT/PURPOSE

4.6.1 Habit of Information Collection

How often the pharmaceutical organization collects the required information is ascertained and the same is shown in Table 4.21 and Fig.4.12. Accordingly it is seen that 69.9% (86) are regularly collect information. 19.5% (24) of respondents indicated that they collect information based on their needs and 10.6% (13) collects information occasionally.

Table 4.21 : Habit of Information Collection

S.No	Code	Description	No. of Respondents	Percentage
1	OCC	Occasionally	13	10.6
2	REG	Regularly	86	69.9
3	NB	Need Based	24	19.5
		Total	123	100.0

It is an interesting point to note that 86(69.9%) of the 123 respondents collect information regularly as if it is one of their routine duties. All it is an indication that 'information' has become an inseparable component of pharma industry.

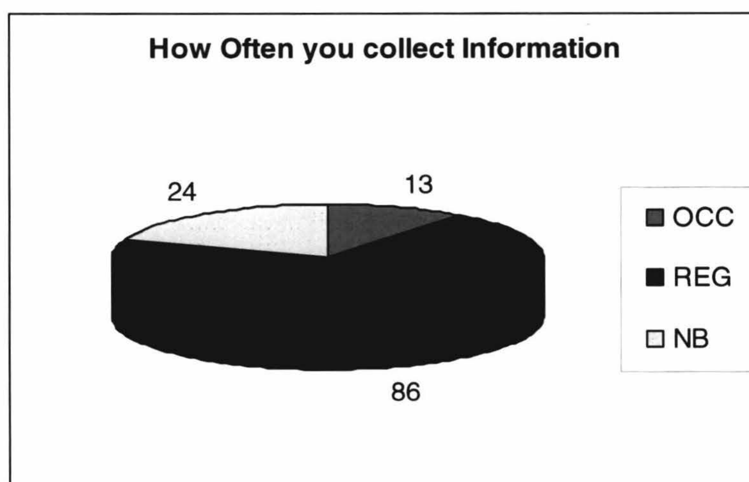


Fig 4.12 : Habit of Information Collection

4.6.2 Media for information collection

Method of collecting information by the Pharmaceutical industries is shown in Table 4.22 and in Figure 4.13. 54.5% (67) of the users collect their information through *Correspondence*, 18.7% (23) through *Internet*, and 13.8% (17) through *Visits.* It is clear that Internet is being used as a second choice for collecting information. This is a positive trend towards Information Communication Technology (ICT) based information channels which are the current trend in the world.

Table 4.22 Media for information collection

S.No	Code	Description	Frequency	Percentage
1	PH	Phone	11	8.95
2	COR	Correspondence	37	30.09
3	EM	E-Mail	35	28.45
4	INET	Internet	23	18.69
5	VIS	Visits	17	13.82
		Total	**123**	**100**

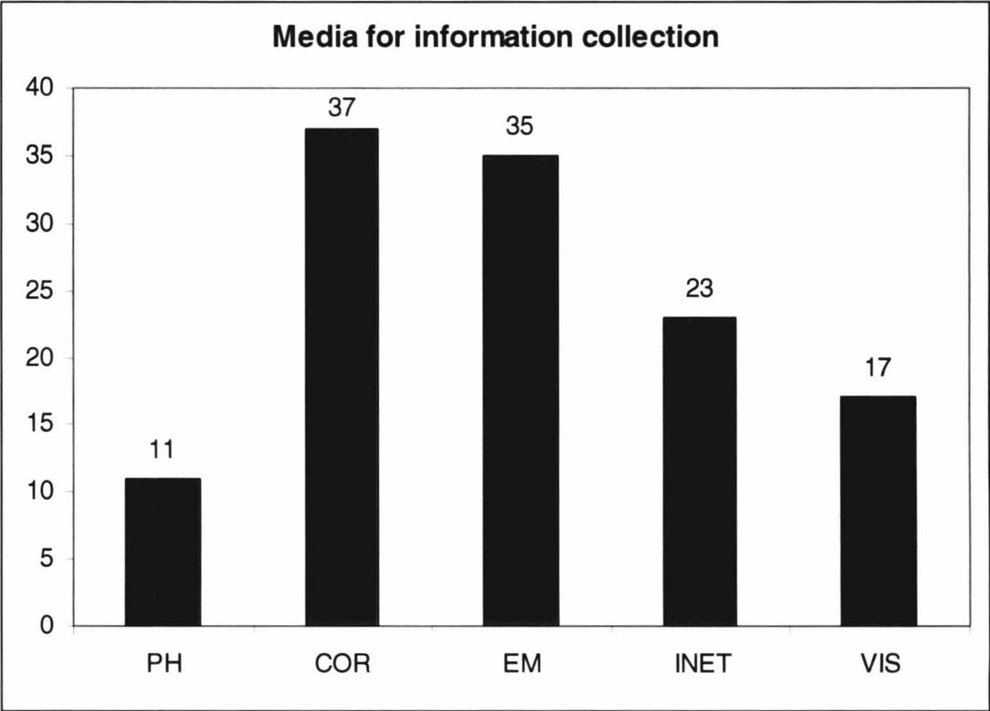


Fig. 4.13 Media for information collection

Still correspondence and its new avatar e-mail takes the pride of most preferred medium of communication.

4.6.3 Information Satisfaction Rate

The satisfaction over the information thus collected through the above process (Table 4.22) has been ascertained from the respondents and the same is shown in Table 4.23 and Figure 4.14. 58.5% (72) respondents indicated that they are *always satisfied* with the information they collect and 31.7% (39) indicated that they are *"Generally satisfied"*, others said they are not or seldom satisfied.

Table 4.23 Information Satisfaction Rate

S.No	Code	Description	Frequency	Percentage
1	AS	Always satisfied	72	58.5
2	MOS	Often satisfied	11	8.9
3	GS	Generally satisfied	39	31.7
4	SS	Seldom satisfied	1	.8
		Total	123	100.0

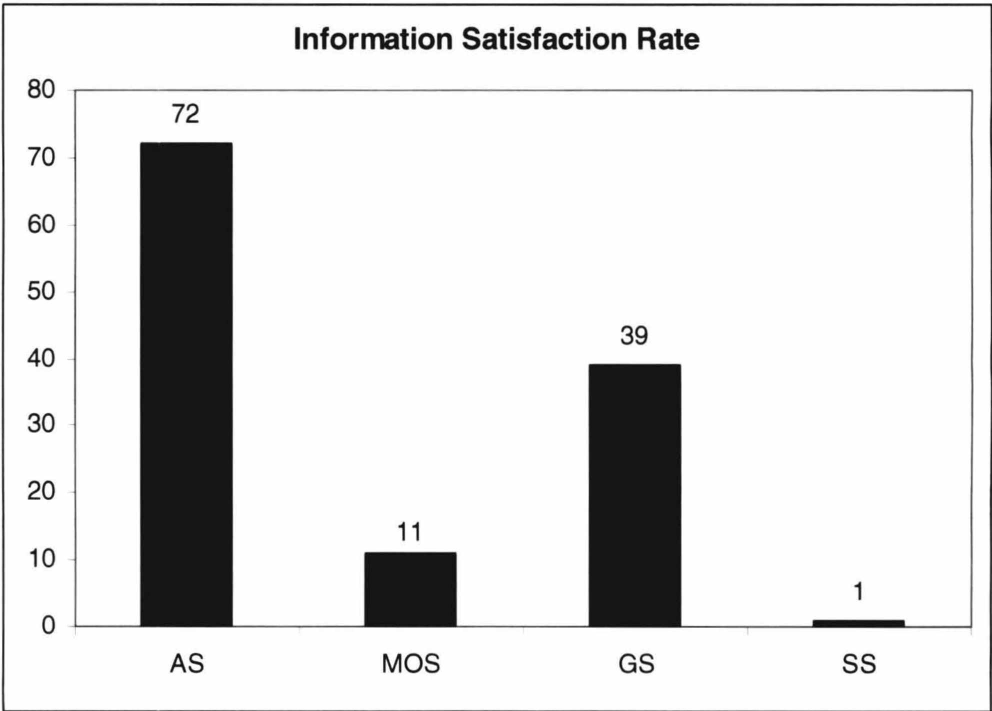


Fig 4.14 : Information Satisfaction Rate

This trend is an indication that the managers who are the respondents, always collect the required information for specific purposes.

The reasons for non satisfaction over the information thus collected by the pharmaceutical industries have been shown in Table 4.24 and Fig. 4.15. *"Lack of Complete Information" (45.4%). "Unorganized"* (27.3%)

and *"Partially available"*, (27.3%) are indicated as other reasons for not satisfied with the information thus collected by them. This situation would have been arised to them, because, it is a practical situation that the information sources are normally not well organised for easy access, not enough sources procured for want of finance, and not popularised because of reluctance on the part of library staff. All these problems needs to be addressed and a new proposal may be workout.

Table 4.24: Non -Collection of Information

S.No	Code	Description	Frequency	Percentage
1	UNO	Unorganised	3	27.3
2	PA	Partially available	3	27.3
3	LC	Lack of complete information	5	45.4
4	OTS	Others		
		Total	11	100.0

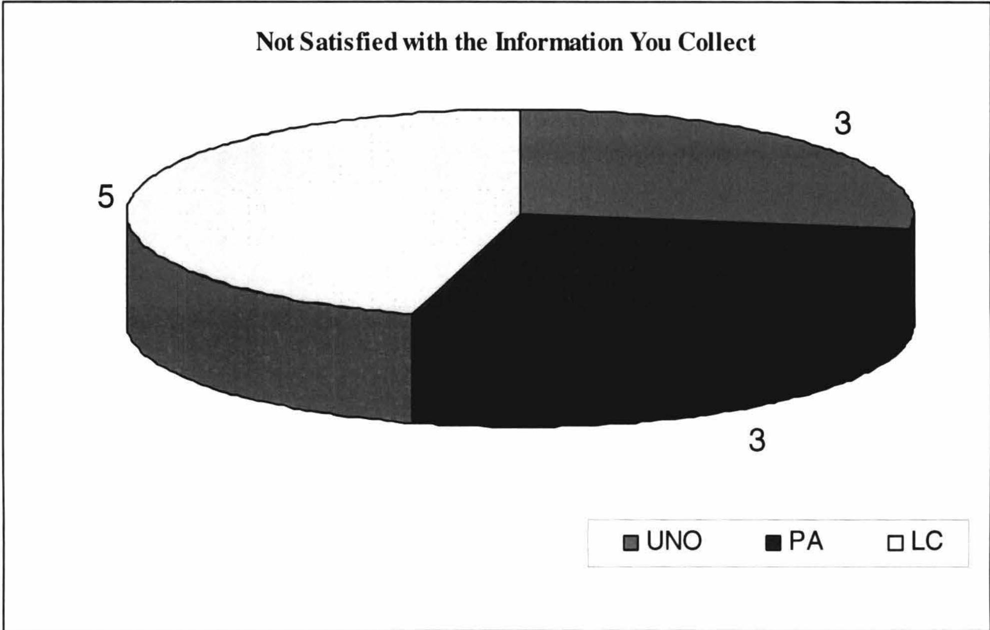


Fig 4.15: Non -Collection of Information

The situations requires onward training for the persons who are responsible for library/information resource centre management.

4.6.4 Timely information

Table 4.25 and Fig. 4.16 indicates that 82.9% (102) of the respondents are getting the information in time and 17.1%(21) are not getting the information in time when they require.

Table 4.25 : Timely information

S.No	Description	Frequency	Percentage
1	Yes	102	82.9
2	No	21	17.1
Total		123	100.0

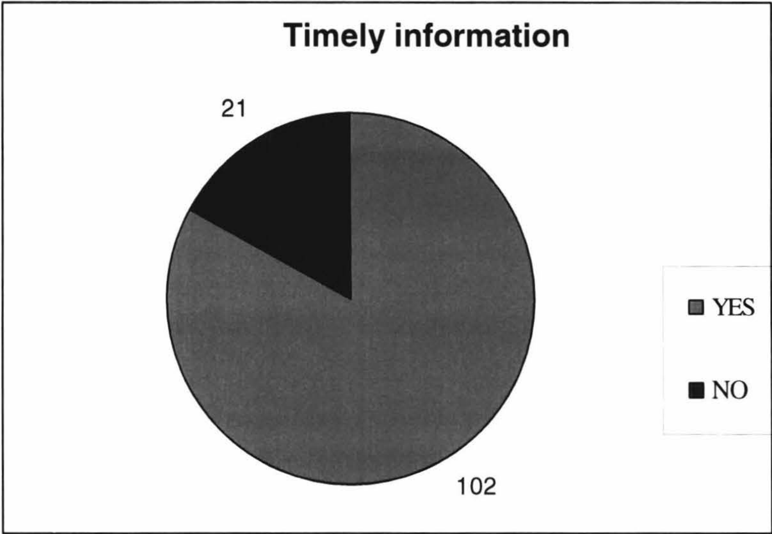


Fig 4.16 : Timely information

From Table 4.23 it is understood that 58.5% of the respondents are satisfied with the information they collect, this is in relation with most of them getting timely information which is in order.

Reasons for not getting the information in time are also analyzed and the same is shown in Table 4.26 and Figure 4.17. *"Distance"* (57.1%); *"Cost"* (28.6%) and *"Language"* (14.3%) are some of the barriers for not getting the required information in time by the Pharmaceutical Industry. The solution for this problem is that of ICT applications for information storage and access. There is a lot of references in literature survey, one such is by **[McClure *et al.*, (1994)]**[47].

Table 4.26 Barriers to Information

S.No	Code	Description	Frequency	Percent
1	DIS	Distance	12	57.1
2	LAN	Language	3	14.3
3	COS	Cost	6	28.6
		Total	21	100.0

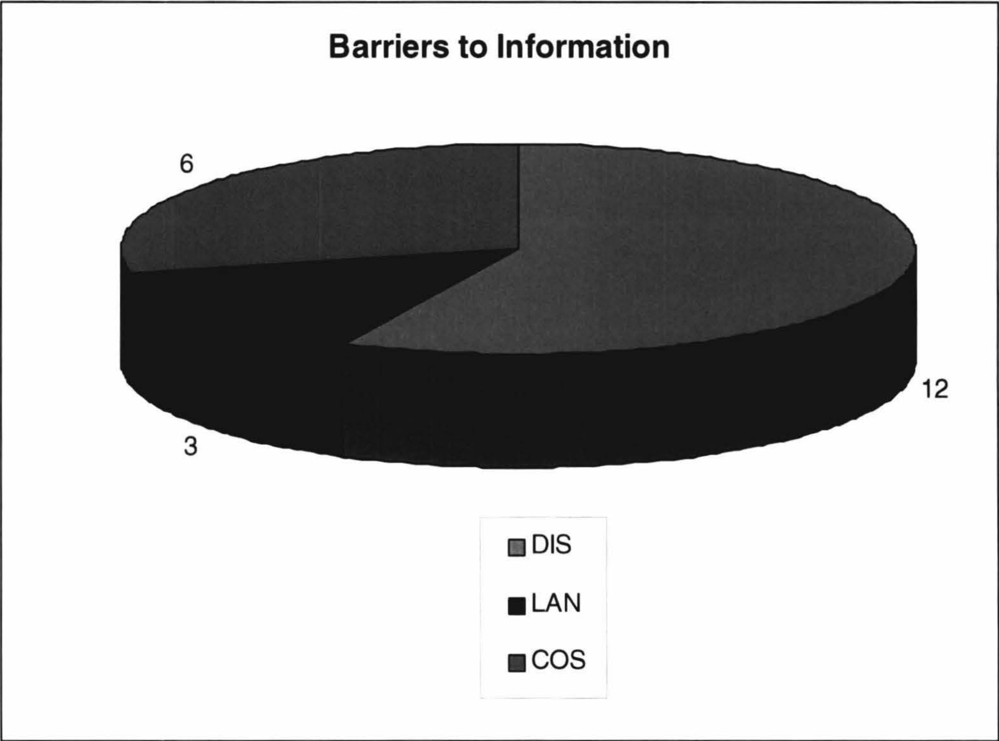


Fig 4.17 : Barriers to Information

4.6.5 Frequency of Information Collection

Amount of time taken by the respondents for collecting the required information has also been ascertained and the same is shown in Table 4.27 and Fig. 4.18. 70.73% (87) of respondents stated that they are taking *"one month"* and 21.13% (26) says that they need *"Six months"* for collecting information. 7.32% (9) respondents need *"one year"* time for collecting information.

Table 4.27 Frequency of Information Collection

S.No	Code	Description	Frequency	Percentage
1	OM	One Month	87	70.73
2	SM	Six Months	26	21.13
3	OY	One Year	09	7.32
4	MTY	More than a Year	1	0.82
Total			123	100.0

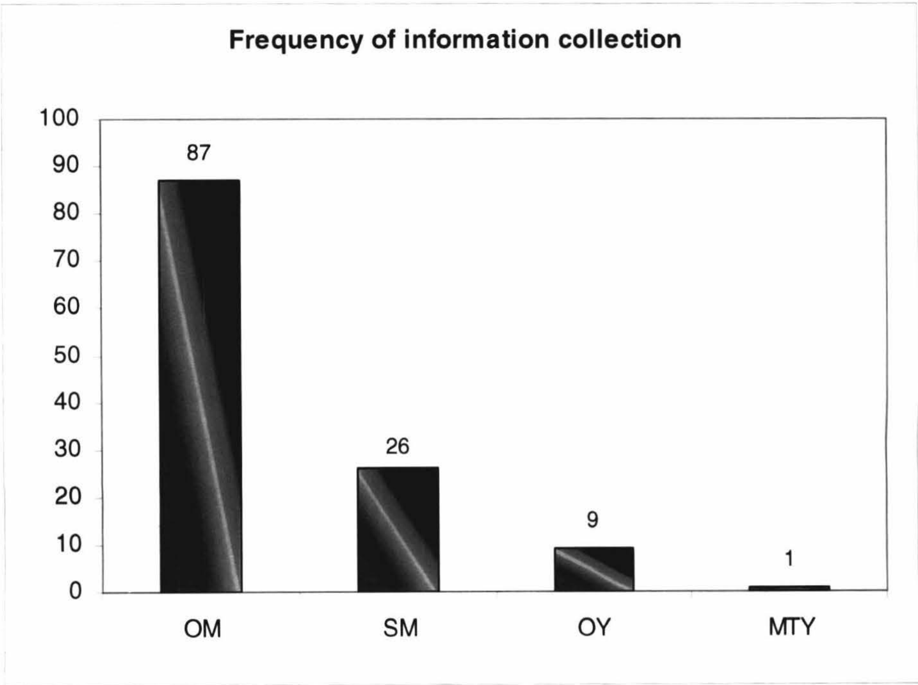


Fig. 4.18: Frequency of Information Collection

This time taken for collecting information has direct relationship with the purpose for which the respondents collect information and also with the nature of information they want.

4.6.6 Storage form of Information

Table 4.28 and Fig. 4.19 shows the method of preservation of collected information by the respondent. It is seen that 61.78% (76) users preferred to store the collected information in *"Personal file"*. The other methods used are *"Computer Storage"* (30.1%) and *"Cards/Paper form"* (8.12%).

Table 4.28 : Storage form of Information

S.No	Code	Description	Frequency	Percentage
1	PF	Personal File	76	61.78
2	SM	Cards/ Paper form	10	8.12
3	CPF	Computer storage	37	30.10
		Total	123	100.0

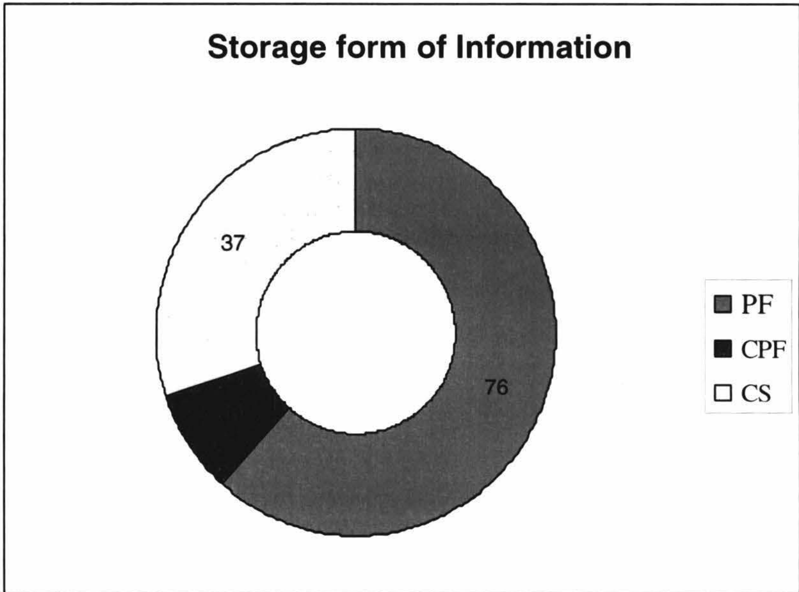


Fig 4.19 : Storage form of Information

Nowadays, computer storage has come to practice, this trend is ascertained by the data 37 respondents (30.1%) shown interest in computer storage.

4.6.7 Purpose of Information Seeking

The respondents were collecting information and storing it certainly for some specific purposes. Hence, question was asked to find out their purpose of reading/referring various information source. Purposes for information seeking and the responses are listed in Table 4.29. Weighted Arithmetic Mean (WAM) has been calculated for each feature. Based on WAM, data, the purposes are ranked.

Table 4.29 : Purpose of Information seeking

Sl. No	Code	Description	1	2	3	4	5	Total	WAM	Rank
1	KKUP	To keep knowledge up-to-date	49 (39.8)	22 (17.9)	8 (6.5)	12 (9.8)	15 (12.2)	106 (86.2)	16	2
2	RW	To do research work	7 (5.7)	12 (9.8)	5 (4.1)	13 (10.6)	2 (1.6)	39 (31.7)	6.7	8
3	IQW	To improve the quality of the work	15 (12.2)	34 (27.6)	19 (15.4)	20 (16.3)	7 (5.7)	95 (77.2)	17	1
4	STP	To solve the technical problem	7 (5.7)	7 (5.7)	18 (14.6)	10 (8.1)	14 (11.4)	56 (45.5)	12.3	4
5	GMI	To get market information	1 (0.8)	5 (4.1)	19 (15.4)	11 (8.9)	12 (9.8)	48 (39.0)	11.4	6
6	KAT	To know the availability of technology	8 (6.5)	10 (8.1)	12 (9.8)	6 (4.9)	17 (13.8)	53 (43.1)	11.5	5

7	BNT	To buy or contract new technology	1 (0.8)	5 (4.1)	1 (0.8)	6 (4.9)	2 (1.6)	15 (12.2)	3.2	13
8	IRDC	To improve R&D in the company	25 (20.3)	4 (3.3)	12 (9.8)	14 (11.4)	23 (18.7)	78 (63.4)	16	3
9	CRW	To collaborate in research work	0 (0)	6 (4.9)	2 (1.6)	8 (6.5)	4 (3.3)	20 (16.3)	4.6	11
10	PIP	To popularise the inventions	1 (0.8)	3 (2.4)	13 (10.6)	1 (0.8)	4 (3.3)	22 (17.9)	4.6	10
11	TTO	To transfer the technology	0 (0)	7 (5.7)	5 (4.1)	1 (0.8)	8 (6.5)	21 (17.1)	4.8	9
12	REPP	To refine the existing products	2 (1.6)	2 (1.6)	8 (6.5)	6 (4.9)	13 (10.6)	31 (25.2)	7.9	7
13	DVP	To diversify products	2 (1.6)	2 (1.6)	3 (2.4)	11 (8.9)	0 (0)	18 (14.6)	3.9	12

From the Table 4.29, it is seen that, the following are the five most rated purposes for information seeking by the respondents.

1. To improve the quality of work (17)
2. To keep knowledge up-to-date (16)
3. To improve R&D in the company (16)
4. To solve technical problems (12.3)
5. to know the availability of technology (11.5)

To get market information (11.4) is the one preferred with interest. All the five purposes are most wanted ones for the overall development of the pharmaceutical companies.

Correlations

Correlation technique has also been adopted to identify the purposes for which they collect information. Correlated values are provided in Table 4.30.

Table 4.30 : Correlation for purpose of information seeking

CODE	KKUP	RW	IQW	STP	GMI	KAT	BNT	IRDC	CRW	PIP	TTO	REPP	DVP
KKUP	1.000												
RW	.868	1.000											
IQW	.808	.103	1.000										
STP	.002	.373	.222	1.000									
GMI	.773	.311	.556	.412	1.000								
KAT	.030	.500	1.000	.023	.045	1.000							
BNT	.275	.	.177	.029	.208	.826	1.000						
IRDC	.000	.100	.002	.032	.724	.143	.030	1.000					
CRW	.047	.001	.378	.303	.	.	.	.000	1.000				
PIP	.456	.008	.199	.802	.062	.	.423	.554	.000	1.000			
TTO	.088	.456	.004	.006	.826	1.000	.	.353	.804	.252	1.000		
REPP	.098	.304	.001	.006	.042	.522	.	.488	.420	.654	.721	1.000	
DVP	.823	.214	.046	.182	.572	.	.	.573	.038	.000	.	.959	1.000

The Correlation matrix table indicates the following major purposes for which the pharmaceutical industries seek information.

- To improve the quality of work
- To keep knowledge up-to-date
- To improve R&D in the company
- To solve your technical problem

4.6.8 Reading Place/Hours

The reading atmosphere has been identified from the respondents and the same is shown in Table 4.31 and Fig.4.20. 92.68% of the respondents collect their information by reading at their Work Place. It is followed by "Reading in other places" (72.35%) and "Reading at Home"(33.33%).

Table 4.31 : Reading place

S.No	Code	Description	Frequency n=123	Percentage
1	RW	Reading at Work	114	92.68
2	RH	Reading at Home	41	33.33
3	OTHP	Reading in Other places	89	72.35

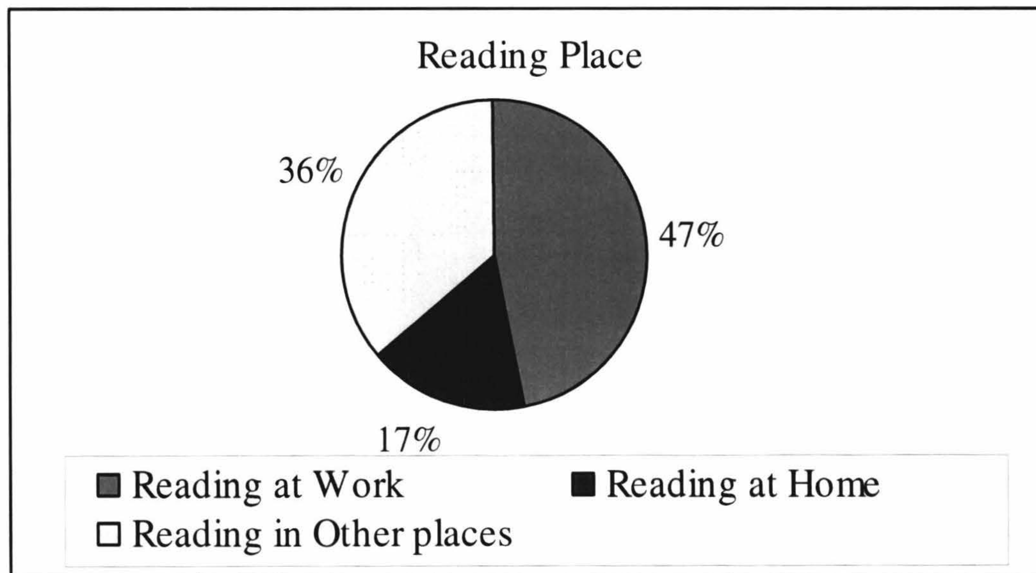


Fig. 4.20 : Reading place

The respondents are managers of pharmaceutical companies, they are at responsible positions, hence they may not have time to go out often, hence they prefer to read at their work place first, then at other places like home etc.

Table 4.32 : Hours of Reading

Sl. No.	Code	Place of Reading	Hours of Reading						Total
			1-100	101-200	201-300	301-400	401-500	501-600	
1.	RD	Reading at library	29	34	8	5	2	4	82
2.	RW	Reading at work	54	26	2	1	-	-	83
3.	RH	Reading at home	75	9	-	-	-	-	84
4.	OTHP	Reading in other places	42	-	-	-	-	-	42

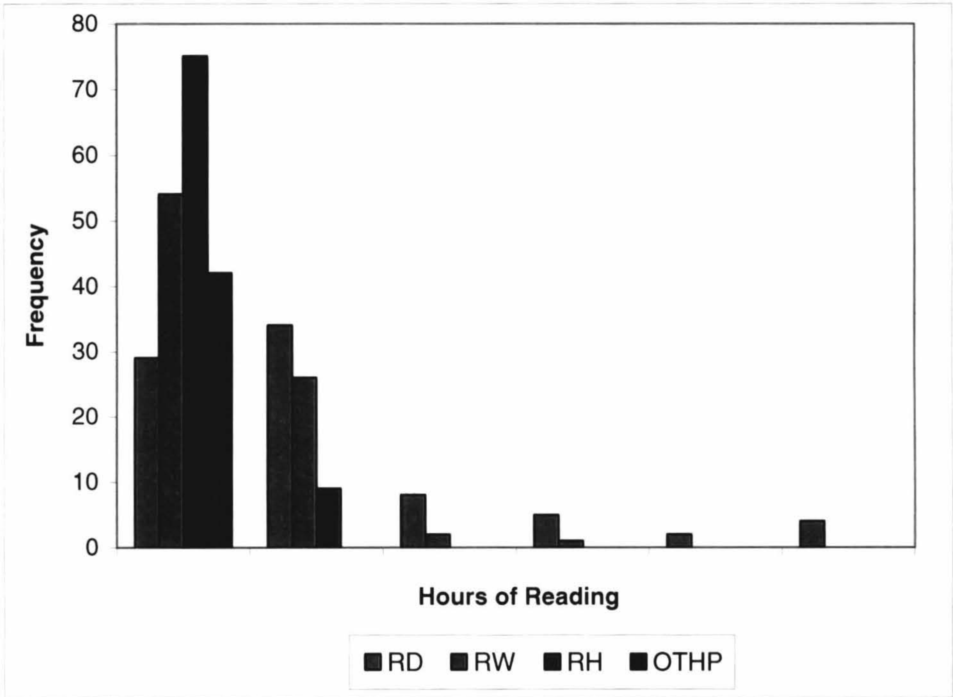


Fig.4.21 : Hours of Reading

Hours spent by respondents on reading in 60 days time has been analysed and the same is presented in Table 4.32 and Figure 4.21. About 34 respondents sent 101-200 hours for reading at library, 29 spent 1-100 hours, 8 spent 201-300 hours, 5 spent 301-400 hours and 6 persons spent more than 400 hours. Then, 54 respondents spent 1-100 hours reading at work place, while 26 spent 101-200 hours, 2 spent 301-300 hours, one spent between 301 to 400 hours. A large number of 75 respondents spent 1-100 hours reading at home and 9 spent 101-200 hours. Reading at other places was shown by 42 respondents for about 1-100 hours. The data at Table 4.32 clearly shows respondents mostly read at library (82) followed by reading at work place (83). 84 at home and 42 at other places. The reading for a purpose has direct relations with the nature of job they are doing.

4.6.9 Time of Reading /Referring

"*What would be the ideal time for reading/referring*" among the Pharmaceutical industry people, which has been ascertained and the same is shown in Table 4.33 and Figure 4.22. Nearly 71.5% (88) of the respondents don't have any restriction in time, in ascertaining the required information. "*Day Time*" 11.4% (14) and "*Morning*" 10.6% (13) were identified as ideal time for reading/referring by a smaller number of respondents. Only 4% (5) of the respondents use holiday for reading.

Table 4.33: Time of Reading /Referring

S.No	Code	Description	Frequency	Percentage
1	MON	Morning	13	10.6
2	DT	Day Time	14	11.4
3	EVN	Evening	7	5.7
4	NT	Night Time	1	0.8
5	HOL	Holidays	5	4.0
6	AT	Any Time	88	71.5
		Total	123	100.0

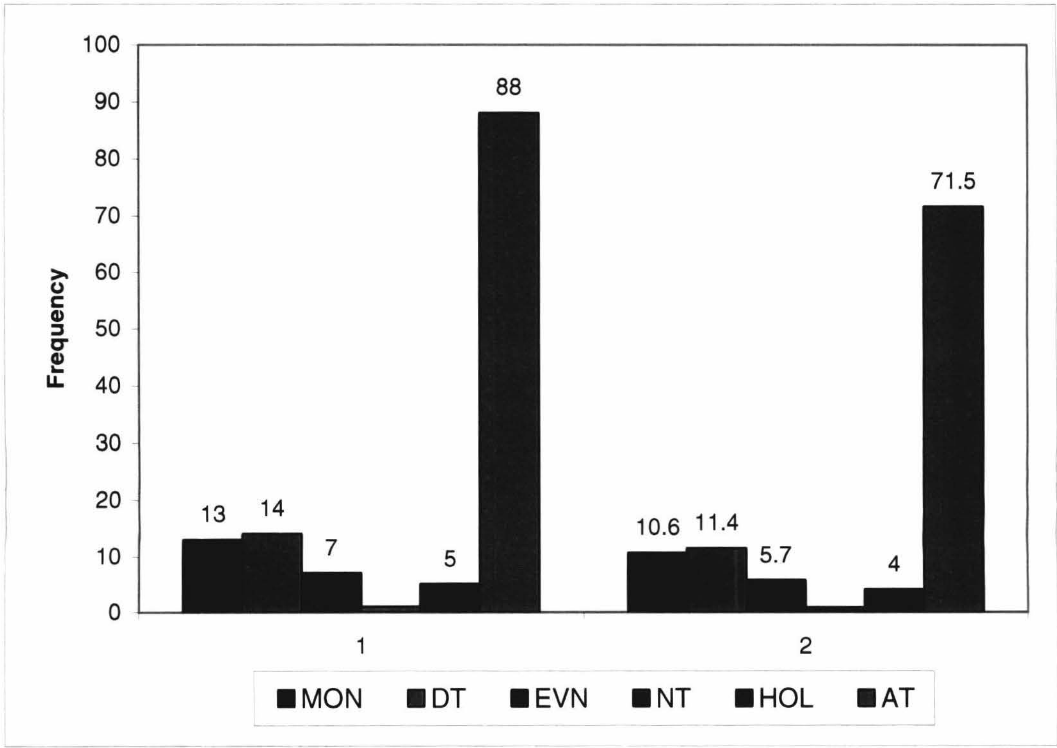


Fig. 4.22: Time of Reading /Referring

4.6.10 Use of Internet facility

To day the Internet and World Wide Web have become inseparable sources of information with the professional activities. In this analysis, the impact of use of Internet and WWW among the Pharmaceutical industry users has been identified. It has been grouped under

- Place of use of Internet facility, and
- Hours of browse through Internet

4.6.10.1 Place of use of Internet

The data thus collected on "Place of use of Internet facility" among pharmaceutical industry users has been analyzed and presented in Table 4.34 and Fig.4.23.

Table 4.34: Place of use of Internet facility

S.No	Code	Description	Frequency	Percent
1	HOM	Home	12	9.8
2	OFF	Office	99	80.5
3	OUTS	Outside	12	9.8
		Total	123	100

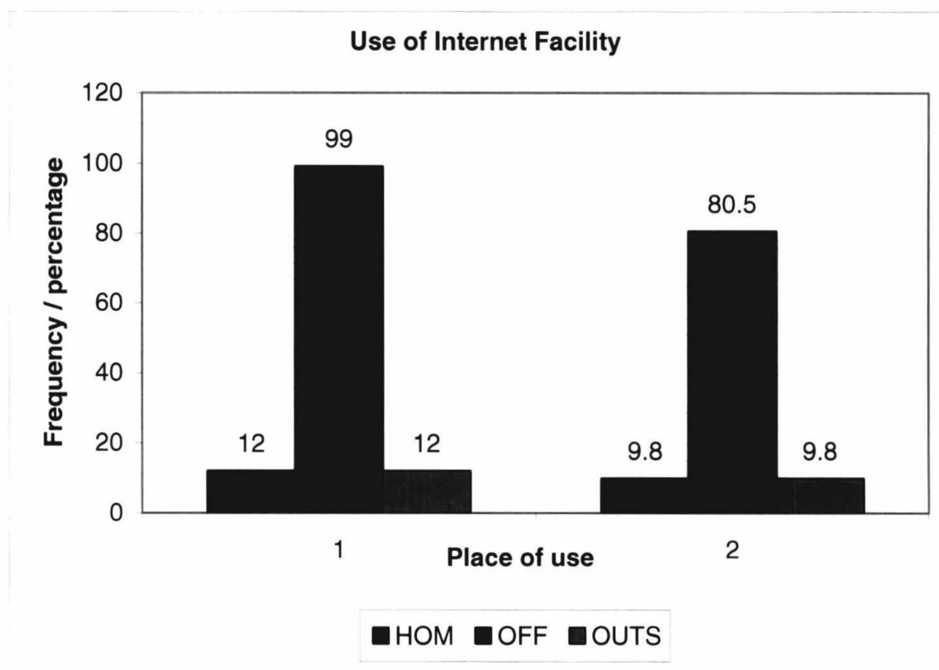


Fig. 4.23: Place of use of Internet facility

It can be seen from Table 4.34 and Fig 4.23 that 80.5% of users, use Internet facility available in their office. Use of Internet facility in the "Home" and "Outside" ranges to 9.8%. Further it is seen from the table, all the Pharmaceutical industry users are frequently using the Internet for information collection for the purposes of their activities. Through literature review this point is being corroborated with the points raised by same researchers [**Russel (1983)**[31], **McClure *et al.* (1994)**][47].

4.6.10.2 Hours spent on browse through Internet

The use of Internet by Pharmaceutical industry users has been established in Table 4.34. Attempt has been made to identify the number of hours browsed through Internet by this group within 60 days times and the same is shown in Table 4.35.

Table 4.35 : Hours browsed through Internet

Sl.No.	Hours of browsing	Frequency	Percentage
1.	1 - 50	17	13.8
2.	51 - 100	26	21.1
3.	101 - 150	15	12.2
4.	151 - 200	23	18.6
5.	201 - 250	11	8.9
6.	251 - 300	2	1.6
7.	301 - 350	2	1.6
8.	351 - 400	2	1.6
9.	401 - 450	1	0.8
10.	451 - 500	0	0.0
11.	500 +	1	0.8

21% (26) of users are browsing nearly 51-100 hours the Internet for their information. 18.6% of users are browsing 151 - 200 hours in the use of Internet. 13.8% (17) are using 1-50 hours to search the Net. About 11 respondents took 201-250 hours, 2 each of them browsed Internet for about 251-300, 301-350 and 351-400 hours. But one user took nearly 500 hours and the other one took more than 500 hours to browse. This statistics shows clearly the NET is being used heavily for information collection by the personal in Pharma Industry.

4.7 ORGANISATION/COMPANY LIBRARY

4.7.1 Availability of library

In the questionnaire under Part A : Company Profile, a question "A.8 : Kindly mention the library facility of your organisation/company" was asked to know whether the company has a (i) separate organised library, (or) (ii) A store of books on cupboards, (or) (iii) Individual holdings (or) (iv) No library concept. Under Part D : Organisation/company library facilities, again we have asked another question "D.1. Do your organisation/company has a library", which is a straight question to know whether the company has a full pledged, well organised library. This effort is made to have a double check on the concept to get some correct data, since further in this section, questions were asked to know their library collection, services and their information seeking pattern and usefulness of their library facilities etc.

Data provided by the respondents for both the questions, has a match. This phenomena is well explained in section 4.3.6 with Table 4.7 & 4.8. Significantly about 15 companies have well organised library managed by qualified librarians (see Table 4.4), but nearly all of the companies responded have 'library concept', having their book collection being stored in cupboards and managed by senior staff member of the company. Probably, their collection runs into a few thousands, because they are all reference books in nature which is a fundamental requirement for any company to have information on technology, production, and marketing. There are a very few number of companies have 'No concept of library' (19, 15.4%, Table 4.8), but they do use outside libraries. It is found, invariably whether the company has

an organised/cupboard library or not, majority of the respondents have said they do use outside library/information facilities. The facilities mentioned by some of them are : Data Centres, Drug Information Centres, University Libraries, IIT Library, British Council Library, American Library, Other company libraries, etc. Some select few of them have become corporate members of some institute libraries like CLRI, IITM etc.

4.7.2 Library Budget

The companies do have allotted money in their company budget for library facilities too, irrespective of their library being the organised one or cupboard library. Table 4.36 presented data about the company's spending on their library facility for the last three years (2000-01, 2001-02 and 2002-03). From the table it is clear that on an average, 35 companies spent below Rs.25,000, but a majority of the responded companies (54) have spent Rs.25,000 to Rs.1,00,000. The above two groups, may have their libraries in cupboards. But the other two groups, about 3 to 4 companies to spent Rs.1,00,000 to Rs.2,00,000, two companies spent more than Rs.2,00,000. From the individual data it is clear that, two companies have spent Rs.4.5 lakhs and the other two Rs.10 lakhs, while some two spent Rs.4 lakhs and Rs.5 lakhs respectively. Probably, these companies are the once having well established libraries (see Table 4.8).

Table 4.36 : Library Budget

Sl.No.	Amount Range	Budget year/frequency			
		2000-01	2001-02	2002-03	Average
1.	<25,000	35	38	33	35.30
2.	25,000 to 1,00,000	51	50	60	53.66
3.	1,00,000 to 2,00,000	6	3	2	3.33
4.	>2,00,000	2	2	3	2.33

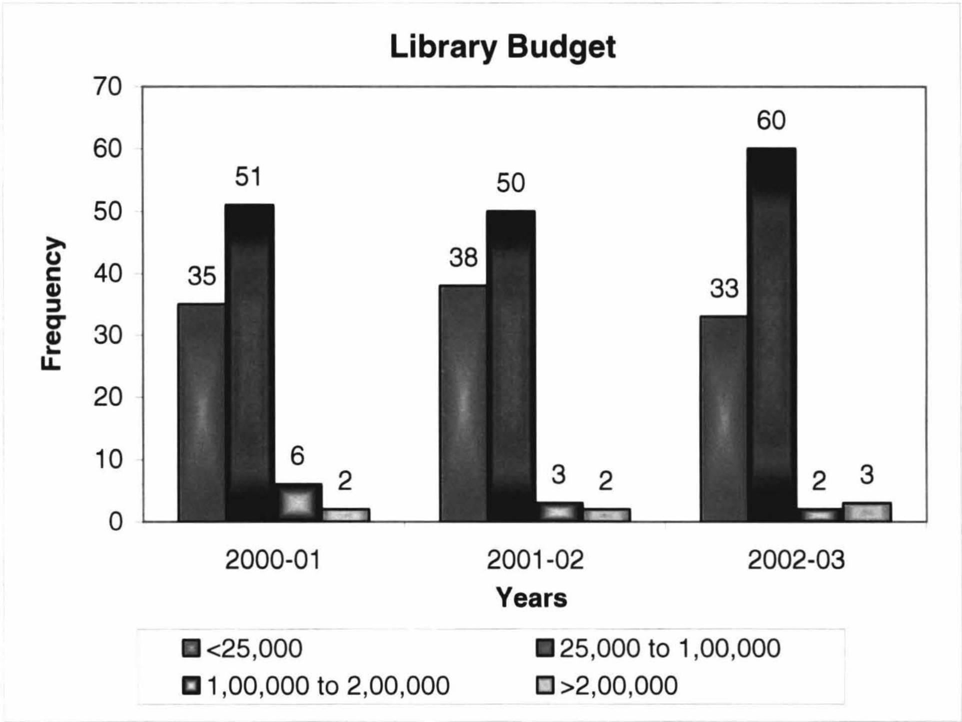


Fig. 4.24 : Library Budget

4.7.3 Library Collection

Library collection whether in the stack of an organised library or stored in cupboards at the responding companies, is an asset to the companies they belong as information store. Nowadays, information has become an important component of any industrial system. Table 4.37 shows, the various types of information sources being procured and stored at each responded companies for information retrieval purpose, besides other sources like Internet facility, outside library membership etc.

99 companies have 1-100 number of books, 7 have 101 to 200 books, 3 have 201 to 300 books, one have about 400 books, only two companies have books in the range of 701-800. But extraordinarily a company is possessing books in the range of 801-3240. The statistics show that, the low collection of books are the indication that all the books are subject and technology oriented towards their company activities. So the libraries are special libraries.

Table 4.37 : Library collection

Range	BC	RBC	CPC	SC	PC	TMC	MC	AV	CD	RC	TCC	BDC	GPC
1-100	99	104	79	75	63	84	24	37	72	87	98	107	115
101-200	7	6	2							2	1	3	1
201-300	3					1			2	1			
301-400	1									2			
401-700		1											
701-800	2	1											
801-3240	1												

Regarding reference books, the companies may be particular in collecting reference books pertaining to their manufacturing or other activities. The reference books are smaller in number titlewise. From the table it is seen that, about 104 companies do have 1-100 reference books in their collection. In the range of 101-200 falls 6 companies, but one company has about 700 reference books, and the other one is having about 800. This trend shows that more or less all the companies who have good library concept do have their good collection of reference books.

Conference proceedings are the primary information sources, the companies do show interest in collecting such sources. From the table it is ascertained that, about 79 companies have about 1-100 conference proceedings. This shows that they are interested in latest technological, production and marketing information. Only 2 companies have conference proceedings to the range of 101-200. Not even one responded company has more than 200 conference proceedings in their collection.

Standards and patents are the two important sources of information for definite transfer of technology or production, hence, about 63-75 companies do have standards and patents in the range of 1-100. The patent and specification collection has direct relevance to the post GATT era situation.

Technical reports and manuals are the standard information sources for any technology/manufacturing/production oriented companies. From Table 4.37, it is clear that, about 84 companies do have technical reports/manuals to the range of 1-100. Only one company shows a range of 201-300.

Microfilm collection, though it is dependent of several other equipments, is still an important source of information. About 24 companies have microfilm collection in the range of 1-100.

Audio-visual materials, certainly will create an impact on viewers. About 37 of the respondents have AV materials in the range of 1-100.

CD-ROM is the current media for storage of information, nowadays lot of information is being stored on CDs. About 72 companies have 1-100 CDs in their collection Two have about 201-300 CDs. This trend shows that the pharmaceutical companies are aware of the advanced storage medium and its use.

Reprints are the real print collection of recent information. About 87 companies shown interest in collecting 1-100 reprints, 2 have 101-200, 1 have 201-300 and the other two have 301-400 reprints. This collection is an asset for the R&D personnel.

Trade Catalogue is yet another important technical source of information. About 98 of the respondents have trade catalogue in the range of 1-100, and only one have 101-200 numbers. Trade catalogue has been preferred as an external documentary channel by about 105 respondents (see Table 4.18).

107 companies have about 100 business digest from various other sources, 3 have 101-200. This will provide synopsis of technical and marketing information.

Government publications do give information on Government rules and regulations. Hence, an important source. 115 companies do have about 1-100 Govt. publications for their reference.

The trend in library collection clearly shows, they have special collections to meet their need which suits their company activities.

4.7.4 Library Automation/Networks

Information and Communication Technology (ICT) is a powerful tool for several kinds of applications. It is very much useful in information storage, access and retrieval purpose. At library level several applications may be made for easy information exchange. No library activities are computerised by most of the company libraries as per the answers received from the respondents. But they are aware of the computerisation, and only their company's are using computers for their company administration work, and some of them established a local network, besides Internet connectivity. Their knowledge about computer power itself is a welcome sign. But many have said they have a future plan to computerise their library activities.

Table 4.38 and Figure 4.25 show about 94 (76%) companies have established their LAN (Local Area Network) which might have been used for other company activities including marketing information. But, certainly they are having Internet facility within their company (112, 91%), E-mail service (108, 88%) and web page (41, 33%). These services are seems to be used by the managers, technical staff for information seeking as well as electronic messaging. This data is inconformity with their answers for using Internet as

an internal channel of information (Table 4.15). Use of networks is familiar for majority of the managers and technical personnel of several companies.

Table 4.38 : Network Facility

Sl.No.	Code	Description	Yes	Percentage
1.	LAN	Local Area Network	94	76
2.	INC	Internet connection	112	91
3.	EMS	E-mail Service	108	88
4.	WEB	Web page	41	33

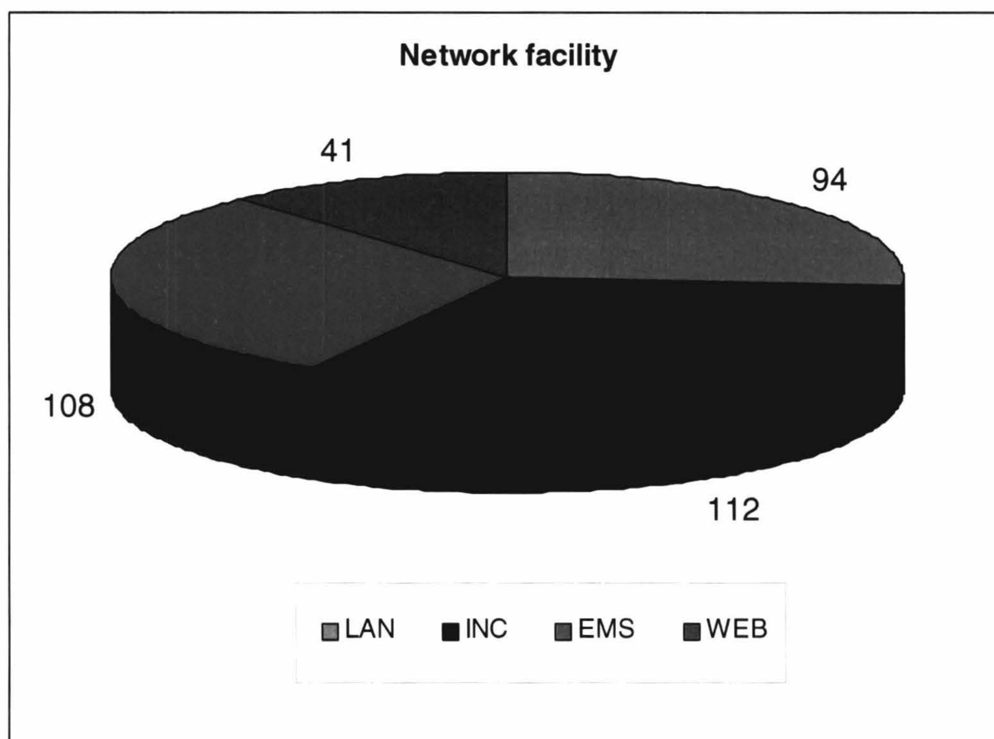


Fig.4.25: Network facility

4.7.5 Library Computer Based Services

Today on-line information services are predominant in any library. In the case of pharmaceutical industry these services become very essential. Hence in this study an attempt has been made to identify whether the pharma industry libraries provide these types of services or not. The data thus collected are shown in Table 4.39 and Figure 4.26.

Table 4.39: Library Computer Based Services - use

Sl.No.	Code	Description	Number	Percentage
1.	OSS	Online Search Service	105	85.4
2.	CDSS	CD ROM Search Service	106	86.2
3.	INS	Internet Service	109	88.6
4.	EMS	e-Mail Service	97	78.9
5.	OPAC	OPAC	22	17.9
6.	WBS	Web based Services	36	29.3

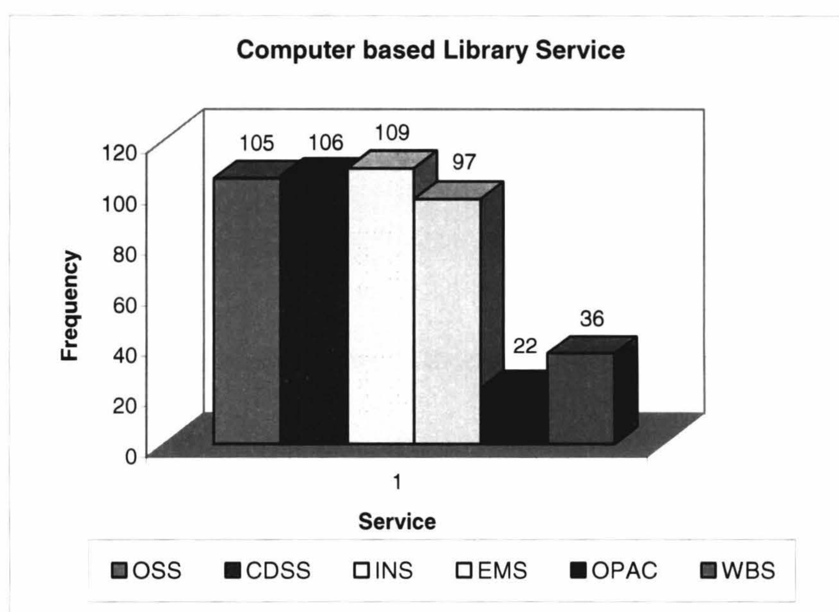


Fig.4.26: Library Computer Based Services - use

It is seen from the Table 4.39 and Figure 4.26 that the following services are being provided by majority of the company libraries.

- Internet Services (109, 88.6%)
- CD-ROM Search Services (106, 86.2%)
- Online search Services (105, 85.4%)
- E-Mail Services (97, 78.9%)
- Web based Services (36, 29.3%)
- OPAC (22, 17.9%)

Further the respondents are asked to rate the level of the utility of those Services. The ratings are shown in Table 4.40. WAM has been applied.

Table 4.40: Library Computer Based Services - Ranking

Sl. No.	Code	Description	1	2	3	4	5	WAM	Rank
1.	OSS	Online search service	18	9	18	20	25	19.67	1
2.	CDSS	CD ROM search service	23	19	10	28	18	19.53	2
3.	INS	Internet service	20	21	46	5	9	17.67	3
4.	EMS	e-Mail service	8	34	12	17	5	13.67	4
5.	OPAC	OPAC (online public access catalogue)	2	1	-	-	-	0.27	6
6.	WBS	Web based services	4	1	3	2	2	2.20	5

From the WAM data, it is ascertained that the following four services are mostly preferred by the pharma companies in order of preference.

1. Online Search Service (19.67)
2. CD ROM Search Service (19.53)
3. Internet Service (17.67)
4. e-Mail Service (13.67)

The priority of information services that are predominant for the pharma industry has further been ascertained through Cluster Analysis. The Dendrogram using average linkage method is shown in Figure 4.27.

4.7.5.1 Hierarchical Cluster Analysis

Dendrogram using Average Linkage (Between Groups) has been work out to find the most preferred library ICT based services. The same is represented by the Fig. 4.27.

Rescaled Distance Cluster Combine

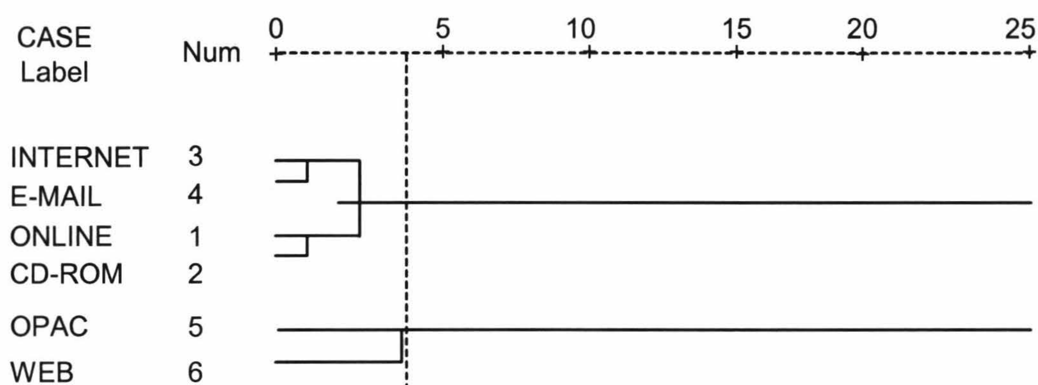


Fig.4.27: Dendrogram - Computer based services

At 18% level there formed two Clusters. The Cluster-I can be named as "Preferred Services". The Cluster-II can be named as "Additional Services". The Preferred Services (Cluster-I) comprises of four services such as

- Internet
- E-mail service
- Online search
- CD-ROM service

The Additional Services (Cluster-II) comprises of two services such as

- OPAC
- WEB services

4.7.5.2 Proximity Matrix

Distances between the services have been ascertained through Proximity Matrix study.

Table 4.41: Proximity matrix for Computerised Services

Case	OSS	CDSS	INS	EMS	OPAC	WBS
OSS						
CDSS	19.000					
INS	20.000	21.000				
EMS	22.000	27.000	18.000			
OPAC	83.000	84.000	87.000	75.000		
WBS	69.000	80.00	73.000	67.000	26.000	

From the Table 4.41 it can be seen that CD_ROM Service, Online Service, Internet, E-Mail have less distance between them, which indicates these are the primary services that are essential in the pharma industry. Here, we are able to co-relate data and discussions provided earlier in the section 4.7.4 with that of section 4.7.5. This clearly inform us that the companies are using those computer based services out of their own network and internet facilities, very minimal number of company libraries only provide these kinds of computer based services. In some of the companies, the company Internet, e-mail services are placed in libraries.

4.7.6 Special Database Services

The companies do use special Database Services, about eleven databases are listed to have the use data from the respondents. They have responded positively. The results are presented in Table 4.42 and Figure 4.28.

Table 4.42 : Special Database Services

Sl.No.	Code	Description	Frequency	Percentage
1.	EJL	e-Journal	96	78.0
2.	MLINE	MEDLINE	84	68.3
3.	PLINE	PHARMLINE	31	25.2
4.	PIND	POISINDEX	18	14.6
5.	CA	Chemical Abstract	63	51.2
6.	BSA	Biological Science Abstract	38	30.9
7.	IPA	IPA	57	46.3
8.	DIND	DRUGINDEX	21	17.1
9.	CAN	CANCERLIT	17	13.8
10.	MAPA	MAPA	29	23.6
11.	PAT	PATENTS	12	9.8

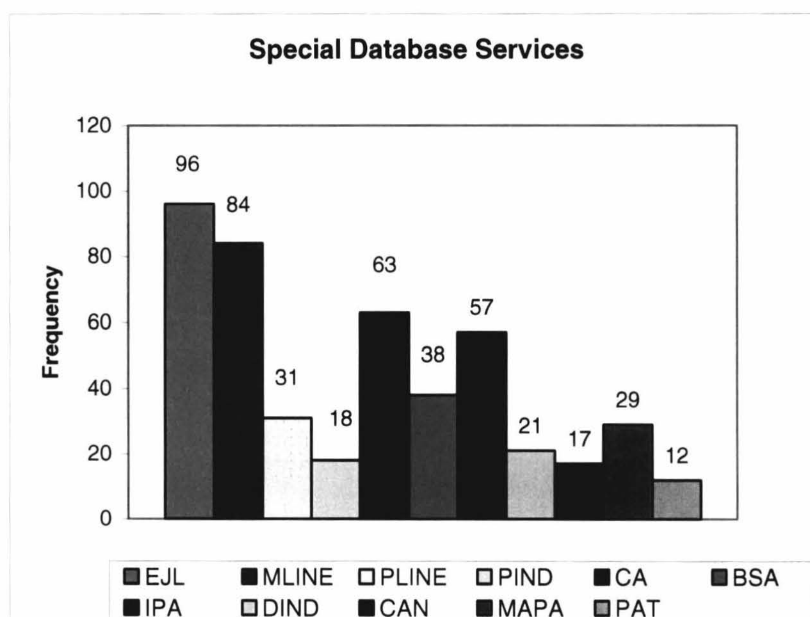


Fig.4.28 Special Database Services

From the data, it is clear that, 96 respondents (78%) said e-journal search facilities are preferred by them for their full-text search and use for research and development work. The other important at their disposal are: MEDLINE (68.3%), Chemical Abstracts (51.2%), IPA (46.3%), BIOSIS (30.9%) and PHARMALINE (25.2%). This statistics clearly indicate that the pharma industrial personal are aware of all such special databases and have the benefit of using some of those databases for their purpose of work.

The satisfactions over these services are ascertained by requesting the respondents to indicate their rating from Low to High to the level of five. The data thus collected are tabulated in Table 4.43. Based on the rating, WAM has been calculated and ranks were assigned.

Table 4.43: Satisfaction over library online sources

Sl. No.	Code	Description	Ranking					WAM	Rank
			1	2	3	4	5		
1.	EJL	e-Journal	34	8	8	7	25	15.13	1
2.	MLINE	MEDLINE	21	7	6	16	7	10.13	2
3.	PLINE	PHARMLINE	3	-	-	-	1	0.53	6
4.	PIND	POISINDEX	-	-	-	-	-	-	-
5.	CA	Chemical Abstract	4	-	-	5	6	3.60	3
6.	BSA	Biological Science Abstract	-	-	-	-	1	0.33	9
7.	IPA	IPA	2	1	1	-	-	0.47	8
8.	DIND	DRUGINDEX	1	-	-	2	2	1.27	5
9.	CAN	CANCERLIT	-	-	-	2	-	0.53	6
10.	MAPA	MAPA	-	-	-	-	-	-	-
11.	PAT	PATENTS	1	-	-	-	7	2.40	4

From the ranking it can be seen that the major information sources preferred in the pharma industries as databases are :

- e-Journal (15.13)
- MEDLINE database (10.13)
- Chemical Abstract (3.60)
- PATENTS (2.40)
- DRUG INDEX (1.27)

However CANCERLIT and PHARMLINE are also been preferred by some of the pharma industry.

4.7.6.1 Hierarchical Cluster Analysis

The priority of information databases that are predominant for the pharma industry has further been ascertained through Cluster Analysis. The Dendrogram using Average Linkage method is shown in Figure 4.29.

Dendrogram using Average Linkage (between groups)

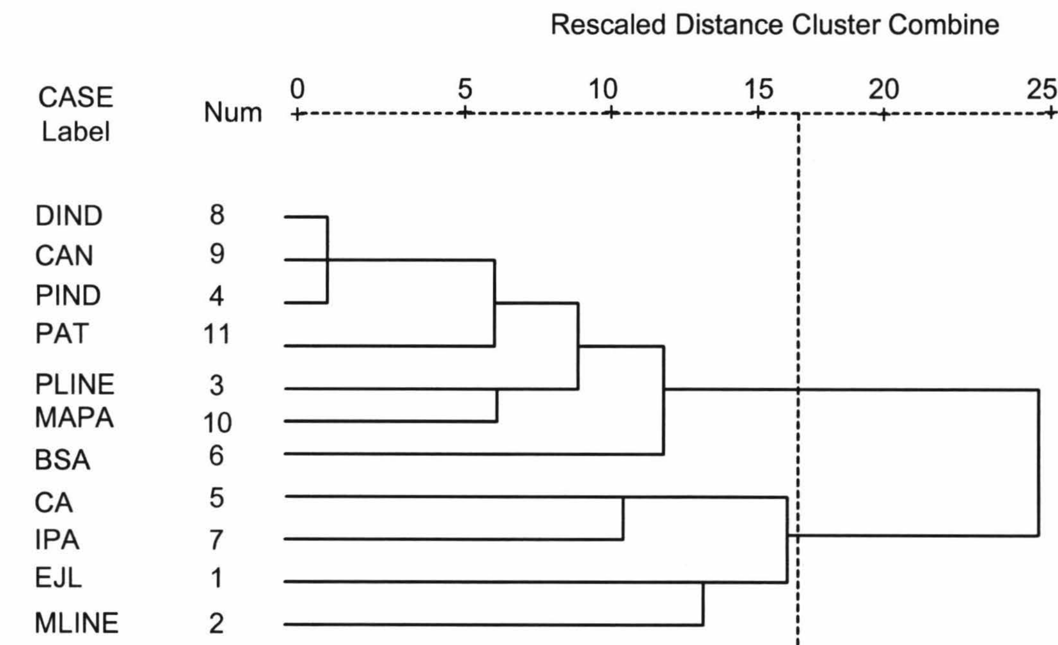


Fig.4.29: Cluster for Database Services

At 64% level there formed two Clusters. The Cluster-I can be named as "Predominant Services". The Cluster-II can be named as "Additional Services". The Predominant Services (Cluster-I) comprises of four services such as

- E_journal
- Medline

- Chemical Abstract
- IPA (International Pharmaceutical Abstract)

The Additional Services (Cluster-II) comprises of seven services such as

- PHARMLINE
- POISINDEX
- Biological Science Abstract
- DRUGINDEX
- CANCERLIT
- MAPA (Medicinal Aromatic Plants Abstract)
- Patents

All the three studies such as *Percentile, WAM* and *Cluster* confirm the same four database that are predominant in the pharma industry.

4.7.6.2 Proximity matrix for Database Services

Distances between the database services has been ascertained through Proximity Matrix study (Figure 4.30). This will enable to identify the combination of database services that the industry can have for their utility.

Variables	EJL	MLINE	PLINE	PIND	CA	BSA	IPA	DIND	CAN	MAPA	PAT
EJL											
MLINE	32.000										
PLINE	65.000	65.000									
PIND	78.000	78.000	23.000								
CA	39.000	33.000	42.000	53.000							
BSA	60.000	60.000	31.000	30.000	31.000						
IPA	45.000	47.000	36.000	43.000	28.000	35.000					
DIND	83.000	83.000	30.000	11.000	54.000	33.000	38.000				
CAN	83.000	79.000	30.000	11.000	52.000	33.000	40.000	10.000			
MAPA	69.000	63.000	20.000	19.000	42.000	31.000	34.000	24.000	22.000		
PAT	86.000	84.000	29.000	16.000	53.000	36.000	55.000	19.000	19.000	31.000	

Table 4.44 and Fig. 4.30: Proximity matrix for Database Services

From the Figure 4.30, it is event that the following special Databases Services have combined use by the pharma industry.

- CANLIT-DRUGINDEX
- CANLIT - PINDEX
- DRUGINDEX - PINDEX
- MAPA – PINDEX
- PAT-PINDEX
- PHARML-PINDEX
- BSA-PINDEX

From the Additional services, the most predominant database services that are considered by the pharma industry according to Proximity matrix are:

- DRUGINDEX
- PHARML
- PINDEX

The cluster and the Proximity matrix indicates that the pharma industry better to have the following database services which can meet out the requirements of the industry.

- E-Journal
- Medline
- Chemical Abstract
- IPA (International Pharmaceutical Abstract)
- DRUGINDEX
- PHARML
- PINDEX

4.7.7 Conventional Library Services

Libraries are providing traditional/conventional services to its uses from the date of their inception. Question was asked to ascertain whether the company library facilities provide such services to their clienteles or not. The data thus collected from the respondents are shown in Table 4.45 and Figure 4.31.

Table 4.45 : Conventional Library Services

S.No.	CODE	Description	Number	Percentage
1	BLS	Book Lending Service	24	19.5
2	ILL	Inter Library loan	15	12.2
3	CAS	CAS(Abstracting /Indexing Services)	19	15.4
4	RES	Reference Services	73	59.3
5	RRS	Referral Services	30	24.4
6	LSS	Literature Search Services	32	26.0
7	PPS	Product Profile Services	62	50.4
8	TS	Translational Services	14	11.4
9	XS	Xerox Services	76	61.8
10	AVS	Audio & Video Service	65	52.8
11	UES	User Education Service	59	48.0

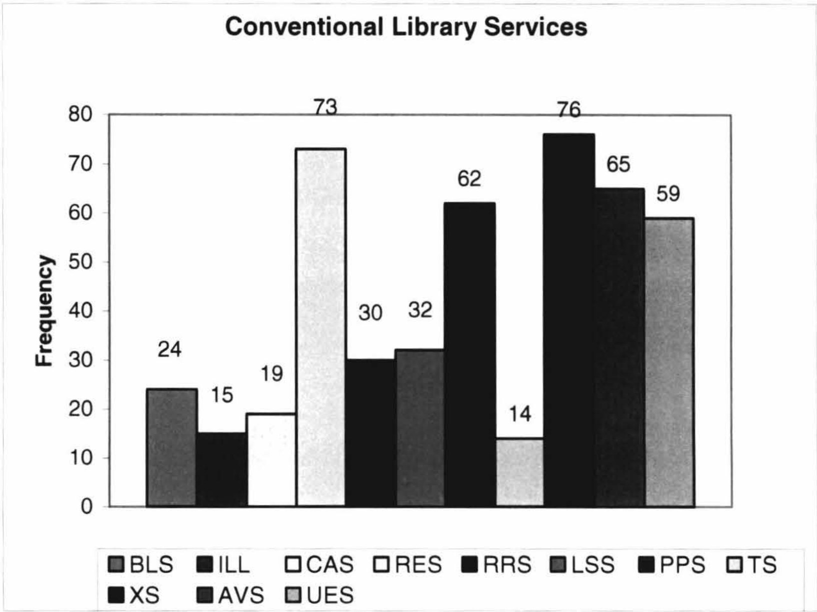


Fig. 4.31: Conventional Library Services

From the data presented in the table, xerox service is the common service by most of the companies/company libraries (61.8%), closely followed by Reference services (59.3%), Audio-visual services (52.8%), Product profile service (50.4%), User education service (48%), Literature search service (26%). All other services including book lending is also been provided by their library facility, but a smaller number of respondents prefer those services. The most preferred services are :

- Xerox Services,
- Reference Services,
- Audio & Video Services,
- User Education Services, and
- Literature Search Services.

4.7.8 Company Library Utility Pattern

The usage of Pharmaceutical Industry library facilities has also been ascertained and the same is shown in Table 4.46 and Figure 4.32.

Table 4.46: Company Library Utility Pattern

S.No	CODE	Description	Number	Percentage
1.	EXT	Extensively	22	17.9
2.	FRE	Frequently	73	59.3
3.	OFT	Often	21	17.1
4.	SEL	Seldom	2	1.6
5.	HAR	Hardly	5	4.1



Fig 4.32: Company Library Utility Pattern

From the Table 4.46 and Figure 4.32, it is seen that 17.9% (22) are extensively using the library. 59.3% (73) of users are frequently using the company library. 17.1% (21) of users used the library often. About 2 respondents seldom use their company library while 5 of the 123 respondents hardly use their library facilities. From the data, it is evident that majority of them ***frequently*** use their company library facilities for information to be effectively used for their work. As described elsewhere, the respondents collect information regularly (69.9%), sea Table 4.21, by making frequent visits to libraries.

4.7.9 Company Library – Use Purpose

Further, in this study, reasons for using the company library facilities have been identified. The data thus collected are tabulated in Table 4.47 and Figure 4.33.

Table 4.47: Company Library – Use Purpose

S.No	CODE	Description	Frequency	Percent
1	GR	For general reading	19	15.4
2	RW	For reference work	84	68.29
3	LITS	For literature search	20	16.26
4	TI	For technology information	32	26.01
5	INFS	To obtain information on a subject	73	59.34
6	CSD	To collect statistical data	6	4.9
7	OS	To obtain specifications	63	51.21
8	CMI	To collect market information	31	25.20

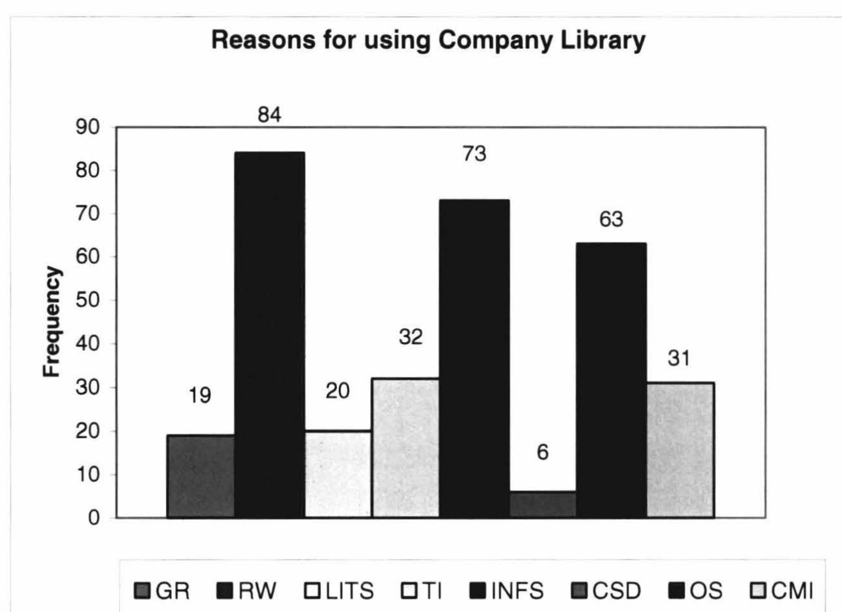


Fig 4.33: Company Library – Use Purpose

It is observed that, generally all users user their company library for some reasons/purposes. The respondents indicated their preferred reasons in using their company library facilities. The data indicates most of the

respondents use their library facilities for reference work (84, 68.29%), 73 (59.34%) of the respondents use for getting information on preferred subjects, to obtain specifications about 63 (51.21%) respondents use their library facilities, collecting market information is the concern of 31 respondents (25.20%), small percentage of respondents use their library facilities for literature search (20, 16.26%), it may be because, their libraries may not have much micro documents or online search facilities. But they want online search services (Table 4.40) to further their research and improve their work.

4.7.10 Library Collection – Satisfaction

Satisfaction over the "*Library Collection/Services*" from the Pharmaceutical Industry library has been ascertained and the same is shown in Table 4.48 and Figure 4.34.

Table 4.48: Company Library Collection – Satisfaction

S.No.	Code	Description	Frequency	Percentage
1	AS	Always satisfactory	41	33.3
2	GS	Generally satisfactory	78	63.4
3	SS	Seldom satisfactory	3	2.4
4	MOS	Most often Satisfactory	2	1.6
5	AU	Always unsatisfactory	0	0

From the Table 4.48 and Figure 4.34, it can be seen that 78 (63.4%) respondents stated that they are *"Generally Satisfied over their library collection"*. 41 (33.3%) of users stated that they are *"Always Satisfactory"*.

In general it is noticed that 96.7% of respondents indicated "*Satisfaction*" over their library collection. No one indicated unsatisfaction over the document collection of their library facility.

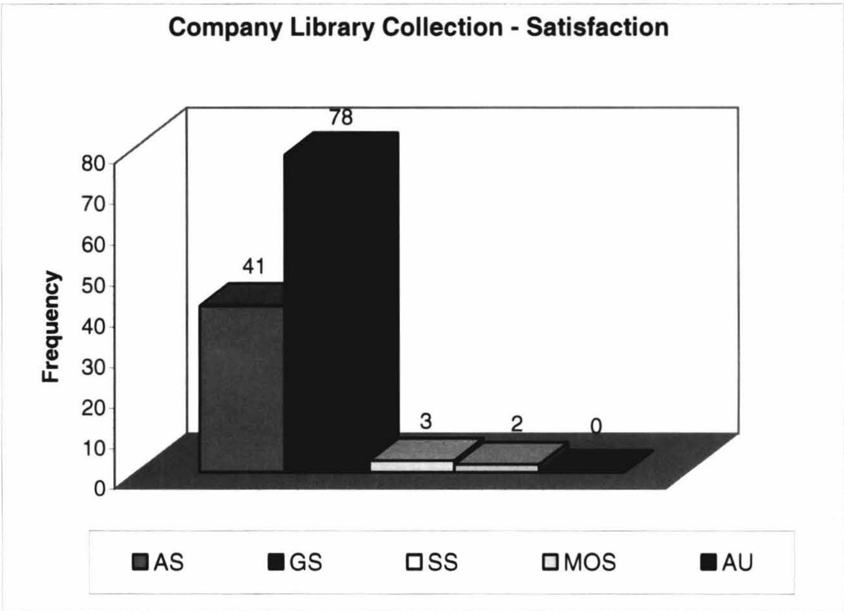


Fig.4.34: Company Library Collection – Satisfaction

But respondents have answered some of the sub-questions about the characteristics of 'Library collection' such as, 'adequateness of collection', 'new additions to the existing collection' etc. The findings are : some say, they want library facilities at their branch office, since currently they are using their Head-office library. Books and journal collection to be improved and increased, want more standards and specification, CD-ROMs, manuals, and bio-tech sources. Some of the databases they suggested to have are : Pharmline, Drugline, Medline, besides full text e-journals. A few respondents suggested to preserve some of the old manuals, books, specifications, reports, by digitization, since they contain valuable information. All the points raised

in this section is a valid suggestions for equipping resources with the newly proposed Pharmaceuticals Information Systems (PIS).

4.7.11 Drug Information Centres

A specific question was asked to findout the company's interest in using well known outside information centres for their information seeking besides their own library facilities. A few well established companies do have knowledge about such centres, eg. CDRI (Central Drug Research Centre, Luknow), and other pharma information centres/associations. Most of them use such centres for Internet search, medical database like Medline, Drugline, BIOSIS, pubmed, MAPA etc. Some have used such centres for e-resources, for full-text and literature search, technology up-date, reference work, specific subject books, and photocopy services are some of the purposes for which they have approached the outside information centres. A few of the respondents expressed that they have no time to visit such centres, while another set of respondents said they are not aware of such centres. From the results, there is ample scope for centralised Pharmaceutical Information Centre (PIS) and after establishment it should be popularised to the maximum extent. This point of having a centralized information center to cater to the information needs of its clientele is stressed by many researchers who have done research on user studies, information needs, awareness and use behaviour at various disciplines. **[Ghose Dastidar[8], Cathleen (1994)[48], Wilson (1999)[63], Ward (1990)[105], Vengan (1993)[44]]**.

4.7.12 Need for New Information Services

About thirteen new information services, mostly based on ICT (Information Communication Technology), are pre-defined and asked the sample population (175) to show their interest in having them, and also their order of preference to the level of six. The respondents (123) reply was analysed and tabulated (Table 4.49 and Figure 4.35). From the table it is evident that on-line search services are prepared by 109 (88.6%) respondents, followed by 108(878%) for CD-ROM search services, 91 of them for product profile information service (74%), 88(71.5%) for E-journals, 78(63.4%) for R & D Project Profile Service, 73 (59.3%) for Technology Information Service, and a lower percentage of respondents prefer to have other types of services.

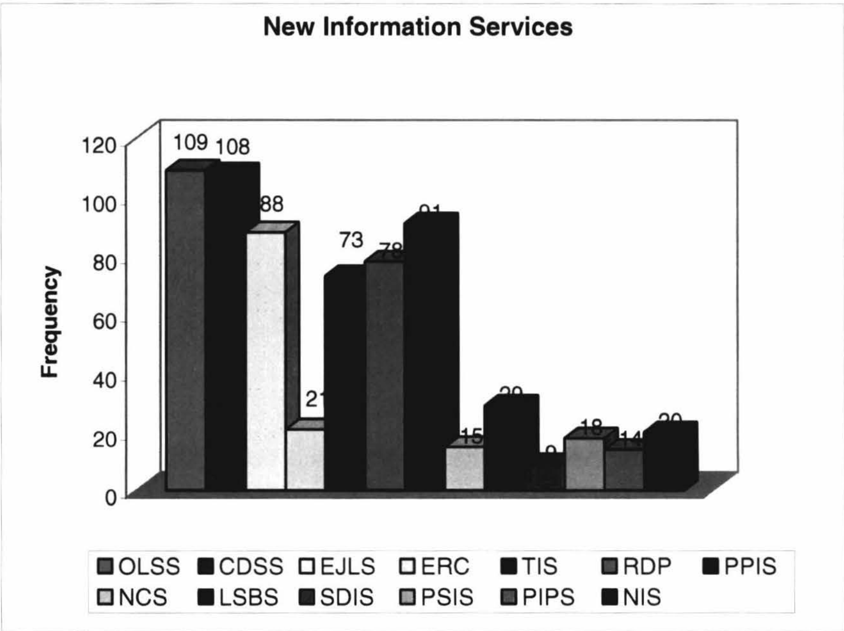


Fig. 4.35: New Information Service - Need

Table 4.49: New Information Service - Need

S.No	CODE	Description	Number	Percentage
1	OLSS	On-Line Search Services	109	88.6
2	CDSS	CD ROM Search Service	108	87.8
3	EJLS	e-Journal Service	88	71.5
4	ERC	Electronic Resources Consortium	21	17.1
5	TIS	Technology Information Service	73	59.3
6	RDP	R&D Project Information System	78	63.4
7	PPIS	Products Profile Information System	91	74.0
8	NCS	Newspaper Clippings service	15	12.2
9	LSBS	Literature Search & Bibliographic Compilation Service	29	23.6
10	SDIS	Selective Dissemination of Information Service	9	7.3
11	PSIS	Patent/Standards Information Service	18	14.6
12	PIPS	Project Information Package Service	14	11.4
13	NIS	NET Based Information Services	20	16.3

21 of the respondents shown interest in e-resources consortium, this is a good move that they have knowledge about the current trend of consortiums. As shown elsewhere, a smaller number of respondents (29,

23.6%) only preferred to have literature search and bibliographic services, this is an indication about their awareness of literature search and the related tools, also only a few of the respondents involve in R & D work, hence the lower percentage, net based services are also been preferred by 20(16.3%) of them. It has direct relation with their Internet usability at their company or elsewhere.

In order to find out the level of utility of these services, the respondents are asked to indicate their opinion from high to low order of priority of the utility do the level of six. The results are tabulated in Table 4.50. The WAM has also been calculated. The ranking based on WAM is also shown in the same Table.

Table 4.50: Ranking of the Library Services

S.No	Description	1	2	3	4	5	6	WAM	Rank
1	On-Line Search Services	31	23	22	14	11	8	14.38	1
2	CD ROM search Service	27	44	7	18	7	5	13.00	3
3	e-Journal Service	5	8	45	12	10	8	14.38	1
4	Electronic Resources Consortium	1	2	1	6	8	3	4.29	8
5	Technology Information Service	8	4	15	30	12	4	12.62	4
6	R&D Project Information System	11	16	13	24	12	2	11.90	5
7	Products Profile Information system	33	4	6	9	30	9	14.24	2

4.7.13 Information Fee

The respondents were asked to record their opinion whether they are willing to pay a nominal fee for the services, if provided on fee based. The opinions are tabulated in Table 4.51 and Figure 4.36. 62.6% of the users are willing to "Pay a nominal fee for the services" and only 37.4% are not willing to pay for the new services

Table 4.51: Information Fee

S.No	Description	Frequency	Percent
1	Yes	77	62.6
2	No	46	37.4
	Total	123	100.0

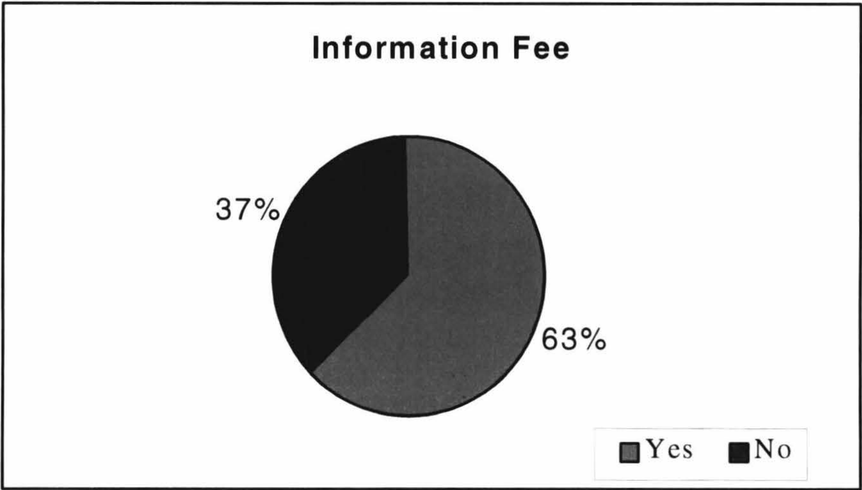


Fig. 4.36: Information Fee

This trend is an indication that, the respondents are more conscious on getting information for their purpose of work even by paying a nominal

amount. Also it concretize the prevailing concept of "Information is a saleable commodity" in the new world order of economic development.

4.7.14 Overall rating of Company Library

Table 4.52 : Company Library Rating

S.No.	CODE	Description	Frequency	Percentage
1	EXC	Excellent	21	17.07
2	VG	Very Good	30	24.39
3	GD	Good	39	31.70
4	FAI	Fair	10	8.13
5.	POO	Poor	04	3.20

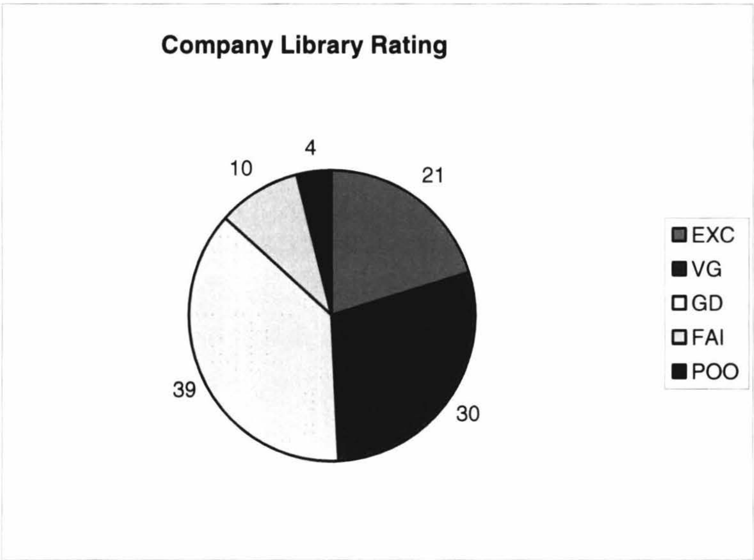


Fig. 4.37: Company Library Rating

We tried to ascertain from the respondents their overall rating of their company library facilities on five point scale. The collected data is presented

in Table 4.52 and Figure 4.37. The company library facilities are ***Excellent***, is expressed by about 21(17.05%) respondents, 30(24.39) respondents said ***Very good***, 39 have said, ***Good*** and 10 said ***Fair***. But only four of the respondents expressed their feeling as ***poor***.

But, 90 respondents out of 104 who have library facilities (i.e. 90.09% of 104) very clearly stated that generally their library facilities are 'Good'. This shows, the respondents are good library conscious persons and also the Pharma Companies are investing on their libraries.

4.8 INFORMATION / SUGGESTIONS / COMMENTS OF RESPONDENTS

With the help of the last question in the questionnaire and also from overall data derived against all other related questions, we are able to get a lot of information, suggestions, and comments from the respondents about the existing library and information facilities and also for the proposed centralized Pharmaceutical Information System (PIS). They are:

- Library collection to be improved with latest editions of books, international journals, text books, all subject books, technical books reports, reference books and R & D specialized collection.
- Interlibrary Loan Service to be strengthened.
- Company Library should enter into outside Corporate Library membership (eg. CLRI, BCL, ARC etc.,).

- Periodic Audio - Video Shows on specialized subjects.
- Library stack should be maintained well.
- Library Budget to be increased by Management.
- Library Timings to be flexible and lengthy to accommodate users timings.
- ICT Based Information Services to be provided.
    - Drug Information Online
    - Bio-Tech Information
    - Faster Information Search Service
    - Online Database Service.
    - Internet and Webpage Service
    - Network Participation for resource sharing.
    - Herbal Information Services.
- Require Central Information Facility
    - Pharmaceutical Information System (PIS)
- Periodic User Meet to get to know newer development.
- Should know about new information centers and sources.
- Librarians need on-ward training
- Users also want to have 'User Education' Programme with specialized training for information search and retrieval to meet the current development in information storage, search, transfer,

retrieval and use. **Lalitha (1995)**[119] emphasised this point through literature.

From the above, the following inferences are made:

1. The respondents, who are normally managers of Pharmaceutical Companies, want to know where the information is, and how to acquire it;

2. They have shown unanimity in, developing their library facilities to meet the modern requirements;

3. All of them have expressed in one form or other, they want to have a centralized ***Pharmaceutical Information System (PIS),*** so that all the people concern with pharma industry can make use of it and benefit a lot; and.

4. An analysis of ability of Pharma Industry in facing the post GATT (General Agreement on Trade and Tariff) challenges indicates that weak information base as one of its weaknesses and increasing the information base / dissemination as one of the issues, which need to be addressed to. **[Gopalakrishnamurthy (2000)**[4]]. This post GATT Information problem will be solved if the Pharma Industry have one centralized Pharmaceutical Information System (PIS), which is being supported by many who are all oneway or other connected to pharma industry and its development.

Chapter 5

Major Findings and Observations

CHAPTER 5

MAJOR FINDINGS AND OBSERVATIONS

5.1 INTRODUCTION

This Chapter summarises the thesis by presenting the major findings, observations and broader conclusions based on the analysis made in Chapter 3 and 4, so as to substantiate the hypothesis and fulfill the objectives listed in Chapter 1. The implications of the conclusions are sought to be presented and elaborated through the prototype model of Pharmaceutical Information System (PIS). However, the broader conclusions from the foregoing chapters are only capsuled for want of space. Also the areas of possible future research to support a model of PIS (Pharmaceutical Information System) is given in Chapter 6.

5.2 Observations and Conclusions

The thesis is a blend of six chapters. The first present a quick look at the growth of Pharmaceutical Industry in India, particularly in Tamil Nadu, the medical system and the GATT impact on Indian Pharmaceutical Industries.

The need for research, the objectives, hypothesis and limitations have been described in Chapter 1. In the second chapter a quick survey of

literature has been presented, so as to focus on the nature of and requirements for a study of information seeking behaviour for pharmaceutical information transfer. The methodology adopted for analyzing questionnaire survey data, from the pharmacy industry, is that of frequency, percentage, correlation, clusters, Weighted Arithmetic Mean, (WAM), proximity matrix, dendrogram, all of which have in recent year, been taken advantage of in large scale data analysis. In the fourth chapter the results of analysis are discussed using said statistical tools. The present chapter summarises the thesis, draws the implications from the analysis. In effect, the implications of the study are the essential features of the prototype model for Pharmaceutical Information System.

From the survey and analysis of collected data there are number of important conclusions drawn, but the most importance are:

1. All pharmaceutical establishments not having a well structured library / information facility. Even if one, there is no qualified library professional to manage the same. In some companies, only managers maintain their small collection of resources and try to avail resources facilities as per their capabilities, hence there is a need for effective good information support system from outside their organization. They also expressed their willing to pay a nominal fee for the information systems.

2. The information available for, awareness and utilization of information by the pharmacy personnals is high enough, but they, depending on their needs, access and time available at their disposal for reference and/or referral

services get to collect the information at varying levels. However there is a high level of use of their company library services has existing now which are not adequate as expressed by them.

3. Although the pharma industries served effectively by their libraries and available external sources, do infact want and require more and better services than the existing once and those which can be obtained. They prefer to have all new information services, with the help of Information Communication Technology (ICT) so that the work can be made easier and more effective in forms of their productivity and trends of technologies effected.

4. The respondents show high discrimination in terms of library information available, awareness, utilization and company library use as for as their activities are concerned and thus they show a different information seeking behaviour certainly, the purpose of which information is availed of are different, and show the seeking behaviour and the levels of their acquisitions are different too. However they do use colleagues, visiting specialist and experts as information sources, and yet feel the need to have new sources established and made available for further use and improvement of their activities.

5. It is seen from the Table 5.1 that they show preference for different channels of information to gather information for their specific work.

Table 5.1: Most preferred information Channels

S.No.	Internal	WAM data	External	WAM data
1.	Personal knowledge, experience	33.66	Supplier/Vendor	21.2
2.	Company Library	31.33	Books	15.8
3.	Company Internet	22.00	Periodicals	14.4
4.	Colleagues	21.83	Institutions	03.8

6. From the view point of respondents there are some policy changes in the organization and functions of their company library which are supposed to be technology oriented. The libraries do have a different progressive role in R and D, productivity and transfer of technology itself is not in doubt. Such a role is necessary for the development and prospectivity of the society at large.

There exists a need for changing policies that are directly related to library support services for pharmacy information transfer. The present policy of library resources building is faulty as it is over concerned with two components only namely, the allocation and the dispersal of allotted funds. There is not much in the policy that would stand the test of validity in a special situation such as pharmaceutical information transfer. This calls for a change in financial policy also, coupled with reclassification of library resources from the management point of view and acquisition of newer resources and services. For a start the policy of purchase of books, so far

followed should be revised to help libraries procure more information sources to catter to the requirement of pharma industry.

Electronic databases, e-Journals, e-books, audio-visual materials, e-training resources etc., should be treated as more valuable in the changing information acquisition and use situation.

7. More and more Information Communication Technology (ICT) tools need to be applied to modernise and accelerate library and information services which will make information exchange and technology transfer more efficient and effective. Network Access, CD-ROM Search, Web OPACs, SDI and Subject Gate Ways are a must if we have to offer, condensation, package and differential information services to the user.

8. The changes suggested above call for a change in the policy of manpower development for both librarians and users. The training of both groups has to be revamped with training facilities for ICT applications in information access and use.

Researchers who have studied information needs, information awareness, information use behaviour, types of information, information channels of people involved in pharmacy technology transfer cycle, have found variations in the contribution of scientific and technical communications and marketing channels to different functions of pharmaceutical industry related practices. The present research also confirms, however, to the same conclusions the others have found (see chapter 2 and chapter 4). **[Russel (1983), Maheswarappa and Nagappa (1990), Choo and Auster (1993), Vengan (1993), McClure *et al.* (1994), Verhoeven, Boerma and Jong (1995), Mohani (2001)]**

The important findings of the present research as well as literature survey regarding the role of information and libraries in Pharmaceutical Information Transfer and the information needs, awareness, utilizations, use behaviour of the persons involved in Pharmaceutical industrial activities are given below:

- Frequent and diverse collection of data has a positive effect on the success of pharma industrial activities.

- Both formal (reading) and informal (conversation with colleagues, browsing, attending conferences, workshops) information exchanges are the critical factors in Pharma Information Transfer.

- Both external (vendors, associates, associations, institutions, documentary sources) and internal (experience, colleagues, company Internet) information exchanges are needed in Pharma Information Practices.

- Information exchanges are also important for the knowledge upkeep and update for solving technical problems.

- External information channels are most important for generating ideas to know market trends etc., while internal channels are most important for solving technical problems.

Existing literature as well as the present research make it imperative that the different type of information as well as different information channels

and sources, are needed at different stages of the Pharmaceutical Industrial Activities.

Major difficulties experienced by the people (respondents) in the present research as well as the findings from other studies are:

- Information collection through correspondence is slow and by visits are not preferred as they are expensive and also because of heavy pressure of work at the collection point and the shortage of time for such collection.

- The Pharma Managers are not fully satisfied with the information they collect. They say that there is no timely information from these sources.

- Lake of quality control in information exchange inhibit the efficient and effective use of information.

- The degree of physical and intellectual accessibility to a particular information channel or source is the major determinant of information use.

Advances in Information and Communication Technology (ICT) have provided greater potential to improve the entire Pharmaceutical Information Transfer process. Computers and electronic networks can facilitate physical and intellectual access to formal pharma information, expand informal communication links and encourage both internal and external information exchanges. Thus, developments in information technology have the potential

to make the marriage between pharma technology transfer activities and information (library and information transfer mechanism) more efficient and effective. This research suggests several ways in which the integration of library support services and the users, will make Pharmaceutical Information Transfer more effective and efficient. An efficient integrated model of Pharmaceutical Information System (PIS) should:

- be based on an understanding of pharma industrial activities, role of library and information centers, and the pharma industry personals (users) information needs, awareness, habits and information use behaviour.
- Provide access to the various kinds of information needed at different stages of the pharma industrial activities.
- Maintain physical and intellectual efforts needed to locate, acquire and use information sources and technology itself.

5.3 Findings in relation to hypothesis

The study and research finding are supportive of the formulated seven numbers of directional hypotheses listed in chapter 1. The same are found valid also.

i. There exists uniformity in the information needs among Pharmaceutical Industries for their research, development, production and marketing and product diversification.(directional)

ii. Pharmaceutical Industries mostly depend on their industry library for satisfying their information needs. Since most of the industrial libraries are specialized in nature to meet the demand of their clients. (directional)

iii. Pharmaceutical Industrialists are more satisfied with their resources and channels they use.(directional).

iv. There exists heterogeneity in the motives for information collection by the Pharmaceutical Industry based on their products and processes. Since the products and processes are different for different industries. (directional)

v. There exists differences in the degree of relevance and dependence in the nature and type of information sought by the industry (directional).

vi. Sharing of information among the industries is a prevailing phenomenon in these pharmaceutical industries, if situation demands (directional).

vii. INTERNET and e-resources are widely used by pharma industry because the pharma information is available in e-forms.(directional)

5.4 BY-PRODUCTS OF THE STUDY

This study facilitated for the production of the following byproducts.

1. The different kind of variables being practiced in information awareness, use and behavioural studies (Appendix..)
2. List of pharmaceutical Industries in and around Chennai City (Tamil Nadu) (Appendix III).
3. A prototype model of Pharmaceutical Information System (PIS) (Chapter 6).
4. A prototype web-page for Pharmaceutical Information Transfer (Chapter 6).

In the next Chapter a model pharmaceutical Information System (PIS) with a web-page is presented.

Chapter 6

Pharmaceutical Information System : A Prototype Model

CHAPTER 6

PHARMACEUTICAL INFORMATION SYSTEM
A PROTOTYPE MODEL

6.1 INTRODUCTION

Today, information becomes an important ingredient in every walk of life and has become an indispensable tool for effective decision making from the individual to the National/International level. It is a well-accepted fact that a country that possesses the capability to utilize quality information can achieve excellence in socioeconomic development, and health is an essential component of the same. Intervention with the aid of medicines forms a vital aspect towards the maintenance of health and hygiene and thus pharmaceutical information is to be recognized as an important part of the information packages.

The pharmacists must be able to retrieve, analyze and communicate drug and professional practice information if society is to benefit from the existence of the profession. The effective management and use of information are the most prominent features of any successful pharmacy practice.

6.2 PHARMACEUTICAL INFORMATION SYSTEM

Pharmaceutical information can be obtained from a number of different resources and is required by different segments of users (pharmacy profession) who have varied roles. An information system should link different resources and users with 3 Es: Effectiveness, Efficiency, and Economy. Various resources where information generated includes Pharma Industries and their R&D departments, Research organizations, Academic Institutions, Drug testing laboratory, Marketing channels, Hospitals and other related health care providers. These can be traced, identified and organized for better use.

6.2.1 Need for Pharmaceutical Information System

The data analysed in Chapter 3 and 4 and the major conclusions arrived in Chapter 5 clearly indicates the necess :ity for a centralized Pharmaceutical Information System. From the findings the need for pharmaceutical information system is understood and the same is as follows:

- Strive to provide comprehensive research and clinical information in pharmaceutics to pharmacy educators, researchers and practitioners.
- Establish pharmacotherapy information databases by collecting, organizing, evaluating, synthesizing, and data processing the up-to-date and pertinent information available worldwide
- Provide fast, accurate and reliable drug information to healthcare professionals in order to improve the quality of pharmacotherapy by

developing appropriate drug information database which can be utilized through information super-highway.

- Improve the professional status of pharmacy practitioners by the collecting and providing drug information available worldwide
- Improve the quality of pharmacy education by developing and distributing educational resources for clinical pharmacy.
- Act as the resources for the clinical pharmacy education to educators , practitioners, and pharmacy students
- Train pharmacists to become competent drug information expert to lead the field of pharmaceutical care in the age of information super-highway.

From the survey and analysis of collected data there are number of important conclusions drawn, the most importance are listed in Chapter 5.

6.2.2 Towards a model of information access system

In the context given above, there is a need to look at some ideas to evolve a model of Information Access System, (IAS) for pharmaceutical information dissemination such systems do exist as a piecemeal approach at varying levels at pharma industries, councils, associations and privates, however considerable refinements for making them operational is necessary. Practically there exists an heterogeneous approach, hence the use of such

facilities may be limited by its worth in the information support for information seekers towards pharmacy information transfer.

An alternative and more effective centralized information system needs, therefore, to be established and such an information system needs to be:

a. Cost – effective as well as information-effective, first and foremost,

b. User participative, nomatter how many users there are,

c. a system offering not only external information services but also providing such services as these on an individual user's asking.

d. a coverage of local, regional, national and global information at the local, institutions level, and

e. an Information Communication Technology based Information System offering need-based and not omni-bus information to the clientele. Hence the proposed Pharmaceutical Information System (PIS) gains more prominence.

6.3 A DESCRIPTIVE MODEL OF PHARMACEUTICAL INFORMATION SYSTEM (PIS)

Under the suggested model, in general, there can be a PIS for every State of India. Alternatively, they may be established in every pharmaceutical companies of considerable size and reach, if need arises. They should be

planned such a way that they provide pharmaceutical information to the needy in the most efficient and equitable manner. The information sources and services (local / national / international) should be ICT based. It should be the center that links the organization with other similar and advanced institutions. Latter, this can be achieved through inter-linking the other State PIS and similar information systems, using models such as INDONET, ERNET, NICNET and INFLIBNET. Each Center may have its own internal networking for transfer of information in the most fruitful fashion.

6.3.1 Objectives of Pharmaceutical Information System (PIS)

The PIS objectives are:

1. To be a central facility for procuring, organizing and disseminating information to pharmaceutical industry.
2. To adopt all modern facilities like ICT for promotion of information transfer and exchange.
3. To facilitate sharing of local information among member companies.
4. To provide electronic as well as other types of information to the needy by acting as an hybrid information center.
5. To avoid wastage of financial resources by means of consortium mode of operation.

6. To provide training and orientation programs to both library professionals and information users of Pharma industries for effective information handling.

7. To popularize new information tools, techniques and services among pharma sector.

8. To develop Subject-Gateways for easy search of required information for specialized groups.

9. To co-ordinate with related information systems at local, national and international levels for better information coverage.

10. To provide a common platform for pharma information to all users concern with.

11. To provide consultancy service with respect to organization of library / information centers etc.,

12. To provide e-conference facilities for interaction among pharmaceutical information providers and seekers.

13. To popularize new information sources and services.

14. To organize seminars, conferences, training and workshops in promoting pharmaceutical information.

15. To co-ordinate with various agencies for promoting pharmaceutical information exchange.

16. To act as a model information system for all others who are in search of a new information system.

6.3.2 Expected output out of PIS

1. Increase access by the participating companies together knowledge and gain experience necessary for pharmaceutical practices.
2. Increases exchange of information among the participating companies based on mutual understanding and use of common communication format.
3. Upgrade information services and higher quality information in support of national planning, pharmaceutical research, pharma education and development of libraries.
4. Trained information professionals, librarians, pharmacy personals, competent for the handling, and effective use of information /data.

6.3.3 Planning the PIS

The activities of the PIS will be grouped under several areas. An interdisciplinary approach may be used in the planning and implementation activities. Keeping in view the needs, priorities and levels of developments of the participating users the following four stages of work plan has been proposed.

1. Development and strengthening the PIS.
2. Exchange of information in the field of pharmaceutical sciences.
3. Establishing general frame work for cooperation.
4. Periodic evaluation and monitoring of PIS.

6.3.4 PIS Location

The proposed PIS (Pharmaceutical Information System) may be located at the state level Pharmacy Council. Since the pharmacy council of the state is the apex body to coordinate with the pharmaceutical industry for their developments in all its respects.

6.3.5 PIS – Organisation set-up

The PIS as a central facility will have several distinct activities and programmes, the following Fig.6.1 clearly depicts the various activities of the PIS.

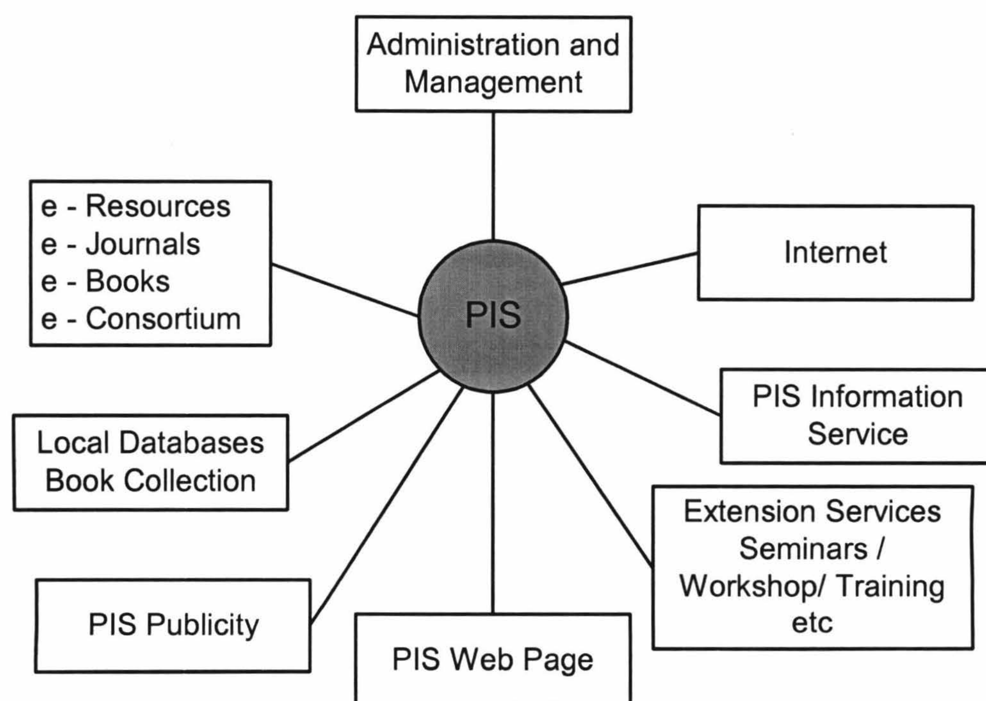


Fig. 6.1: Activities of PIS

6.3.6 PIS – Organisation Chart

The PIS like any other central facility should be organized in a systematic manner. It is proposed that the PIS should be headed by a senior level officer as Director of that system. He should be assisted by his secretarial staff which includes a steno / clerk, a Assistant / Accountant and office. The Director is an overall committed person for the management of PIS. He has to translate the proposals drawn by the Advisory Council (AC) into action.

6.3.6.1 Advisory Council

The PIS and its developments should be planned, advised and monitored by a well constituted Advisory Council (AC) which may have ten members as detailed below:

1.	Director	-	Secretary
2.	State Health Secretary	-	Member
3.	State Finance Secretary	-	Member
4.	A member from Industry	-	Member
5.	President of State Pharmacy Council	-	Member
6.	President of State Pharmacy Association	-	Member
7.	Librarian – Medical University	-	Member
8.	Leading medical Practitioner	-	Member
9.	Librarian – PIS	-	Member
10.	A co-opt member	-	Member

6.3.6.2 The major divisions of PIS

The PIS should have, in addition to its Advisory Council a few major divisions for effective functioning, they are:

1. Library
2. e-Resources Cell
3. LAN and Local Database.
4. Extension Services

The above divisions with its manpower requirements are shown in Fig. 6.2.

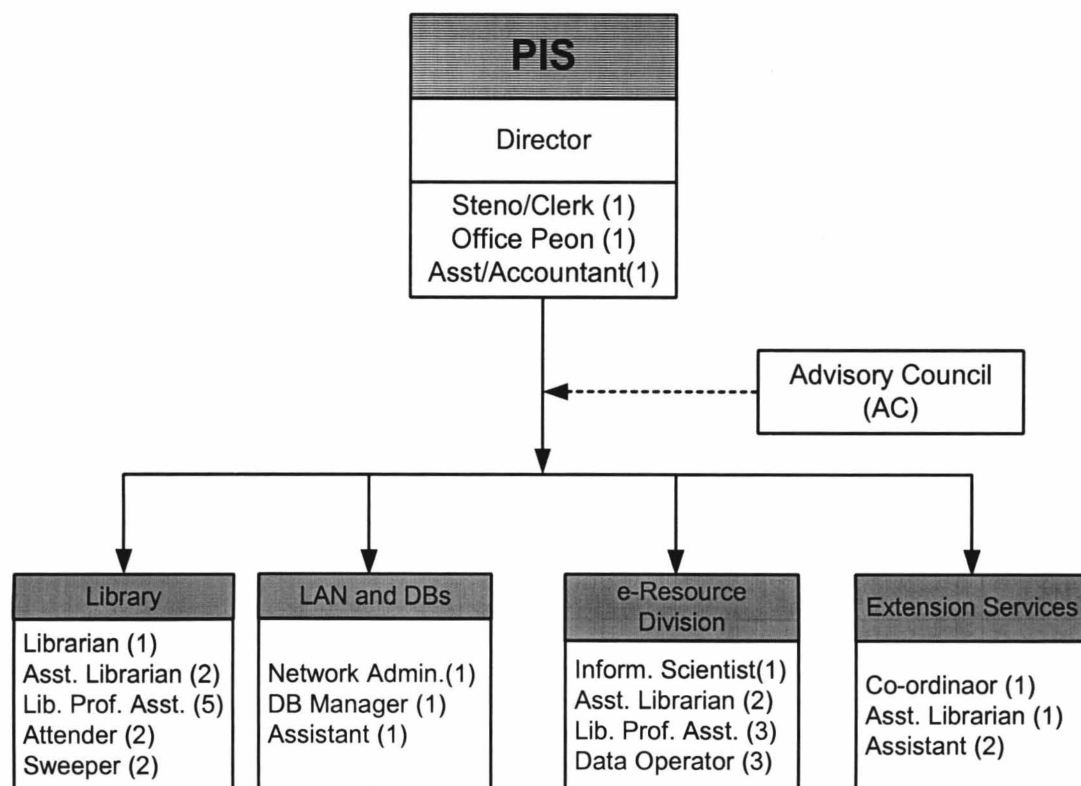


Fig. 6.2: PIS Organisation Chart

6.3.7 PIS Library Division

To- day concept is 'Hybrid Library'. This concept is planned for the proposed PIS. The PIS will have, as shown in Fig. 6.2. four divisions. All the four will function together to give the effect of hybrid library services. The library division will take care of the traditional library services, also it will be an input unit to all other divisions to enhance their activities. The library will have several of its traditional services, as shown in Fig. 6.3, which are useful for information seakers and knowledge developers.

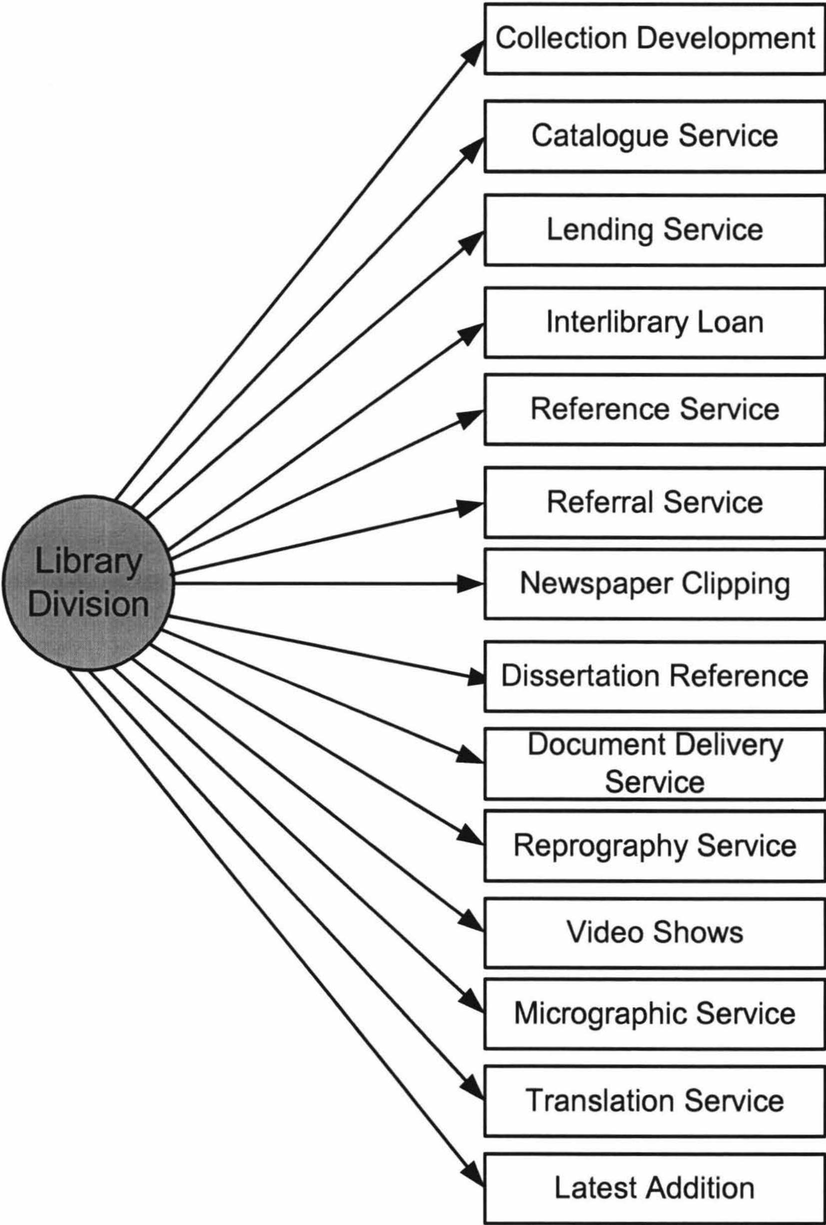


Fig. 6.3: Library Division- Functions and Services

6.3.8 PIS LAN and Database Division

Under LAN and Database division local databases to be created. Local Area Network has to be established with one high end library server plus the required number of work-stations. The general and library applications software to be loaded onto the PCs. This division should create and maintain the required ICT environment for both LAN and Internet facilities. They have to take care of external link to special dedicated networks for search of e-resources elsewhere published and distributed. The functions and services of LAN and Database Division are shown in Fig. 6.4.

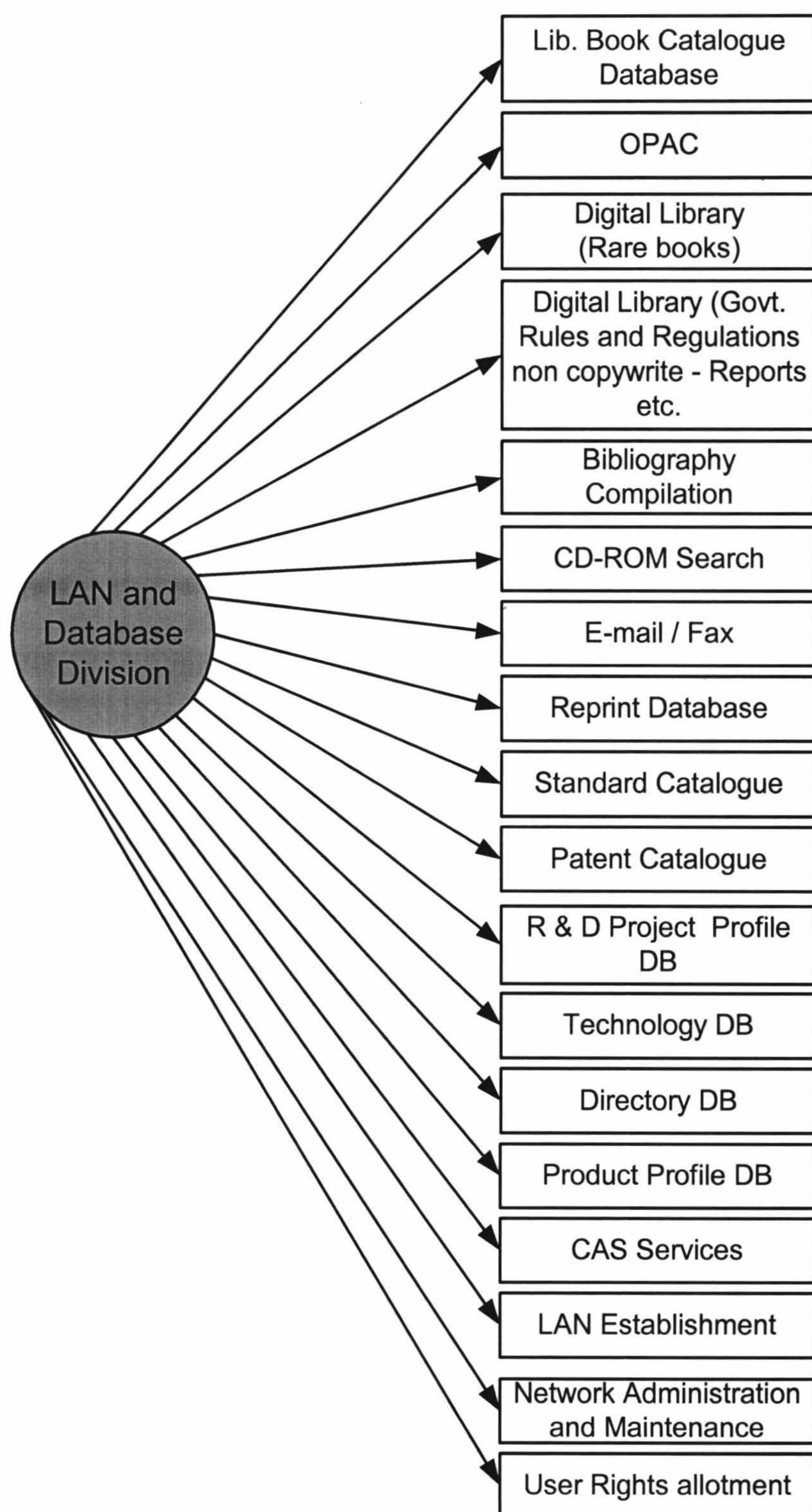


Fig. 6.4 LAN and DB Division -Functions and Services

6.3.9 E-Resources Division

This Division is one of the important divisions of the PIS in the present day context of high technological input and new order of information storage, search and retrieval to minimize the distance and time factor in information storage and retrieval arena. A detailed listing of the functions and services of e-Resources Division is presented in fig. 6.5.

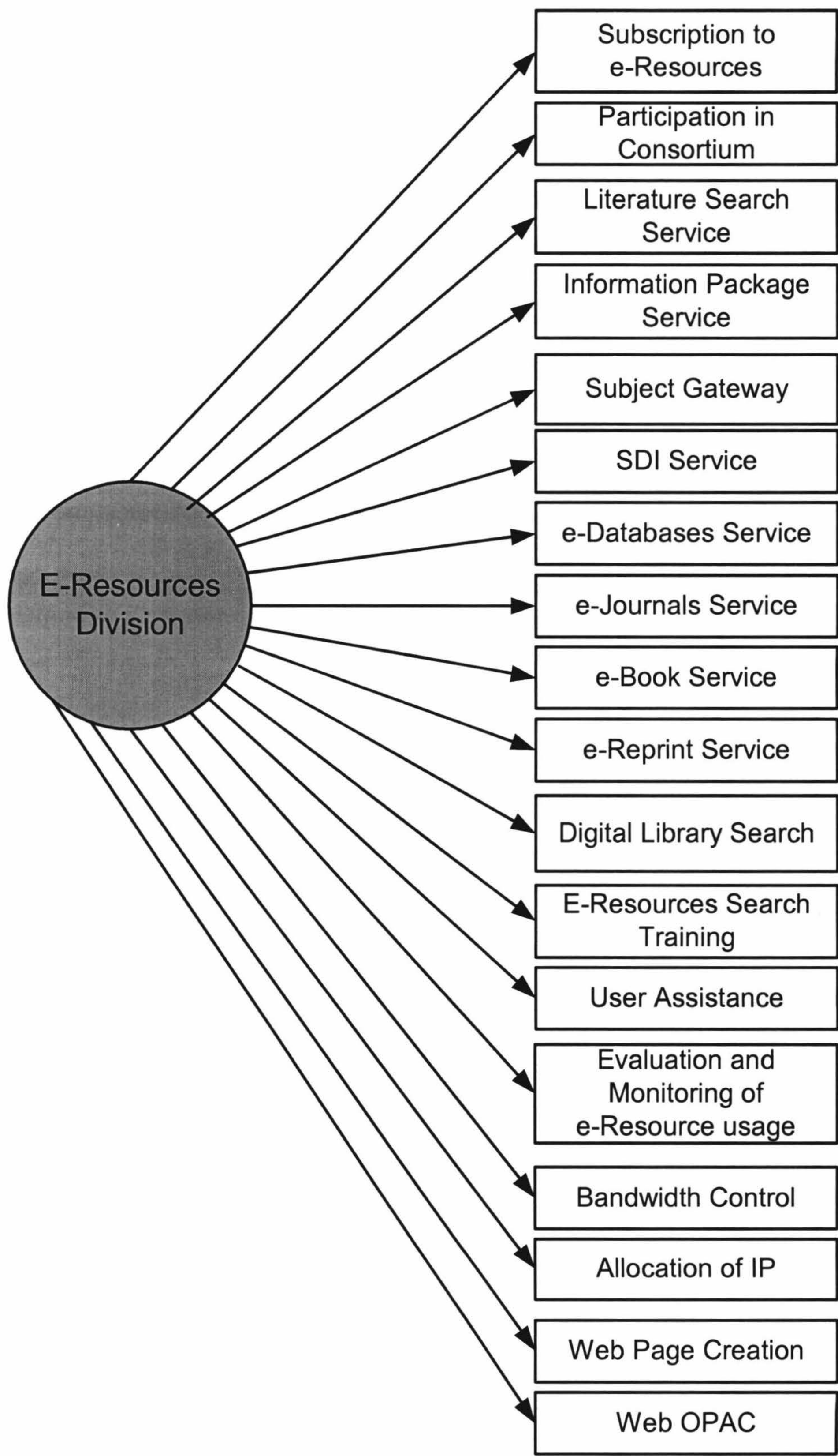


Fig. 6.5: E-Resource Division -Functions and Services

6.3.10 PIS Extension Service Division

This Division is yet another important divisions of the PIS. The functions of the division are more or less public relations in nature. This Division will conduct exhibitions / expositions / fairs/ seminars/ conferences/ workshops / trainings etc., This division is responsible to publish PIS New Letters / Pamphlets and also monitors PIS programme schedule. It has the overall responsibility of keeping the PIS and its users in good humour to further their relationship to achieve goals of both of them. The functions and services of this division are presented in Fig. 6.6.

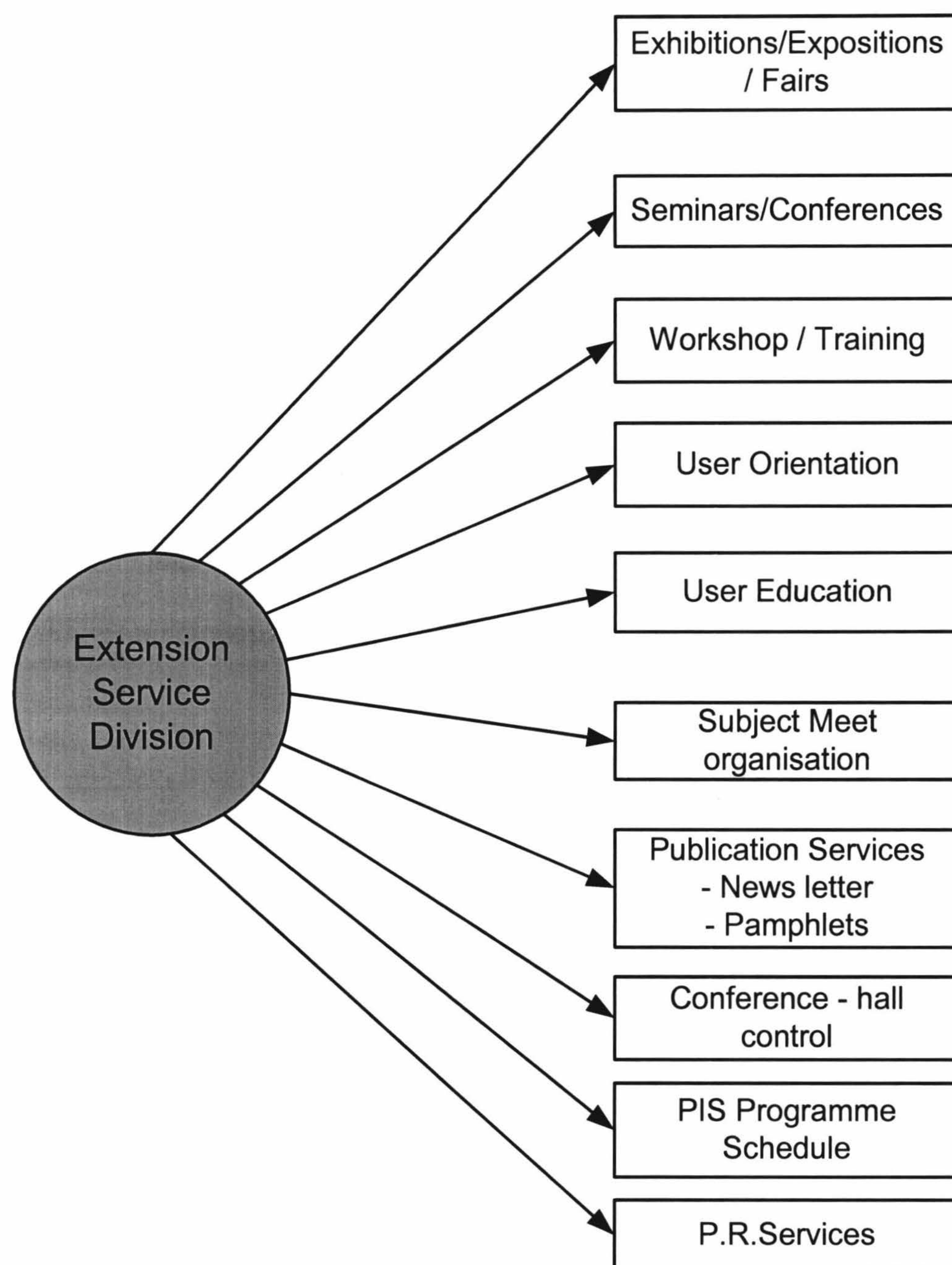


Fig. 6.6: Extension Services Division – Functions and Services

6.3.11 PIS Infrastructure / Equipments

6.3.11.1 Building

The PIS should operate from a separate building to have its existence known as well as to have a free administrative set-up. Also the user members will have free access of PIS for their information requirements. The building of 8000 sq.ft. should have separate space for its Director, and for all its divisions besides common facilities like video-conference room, committee room, multimedia lecture – cum – seminar hall and common facilities. The detail requirement of space is shown in Table 6.1.

Table 6.1: PIS – Space requirements

Sl.No.	Space	Area Sq.ft.
1.	Director Room (20’ x 15’)	300
2.	Committee Room (30’ x 15’)	450
3.	Video Conference Room (20’ x 15’)	300
4.	Multimedia Lecture / Seminar Hall (50’ x 30’)	1500
5.	Library Division (80’ x 30’)	2400
6.	LAN / DB Division (50’ x 30’)	1500
7.	E-Resources Division (30’ x 15’)	450
8.	Extension Service Division (20’ x 15’)	300
9.	Common Facilities	200
10.	Common Places (Varanda, User Language)	600
		8000

6.3.11.2 Equipment/ Furniture

Computer Hardware/ Software:

The PIS should have one library server to take care of the library catalogue and other locally developed databases, OPAC etc. Then, it may require to have one Web Server and one more e-Resources Net Server, besides Workstations (50), UPS (5), Printers (4), Scanners (2), Modems (2), CD-Reader/ Writers (6), Barcode equipments with all accessories including network accessories like switches/bridges, connectors, data cables, etc.

The latest network OS should be loaded on to all servers and workstations. RDBMS package like SQS (or) Oracle, then special application softwares like Photoshop, DTP s/w besides MS-Office should be purchased. Library Management Software like SOUL (Software for University Libraries), LibSys (Library System Software), VTLS (Virginia Tech. Library Software) and any open source Digital Library Software may be planned for effective use.

Reprographic/Video Equipments:

A latest network enabled xerox machine, and a set of video-conferencing equipments can be purchased for PIS. To equip the multimedia Lecture Hall, one set of multimedia kit including PC to screen system should also be added.

Furniture:

The required furniture to stock library books, to accommodate all staff members, users, visitors, to place all computers and other equipments the required functionally designed furniture may be procurred and added to PIS proprietory stock.

6.3.12 PIS Finance

The proposed PIS should financially be supported by several leading agencies. It needs finance for capital as well as recurring expenditures. The capital expenditure is one time spending for creating assets like building, equipment, furniture and other infrastructure facilities. The recurring expenditure involves salary to staff members, subscriptions, book purchase, licenses renewal, communication cost, besides maintenance cost. The required finance can be derived from several sources which is detailed in Table 6.2.

Table 6.2: PIS – Financial Sources

Sl. No.	Source	Remarks
1.	State Government	Since the pharma sector is as important as other industrial sectors to the state. It concerns with health and hygiene of the people of the state. Hence State Govt. may contribute 50% of the financial requirement or PIS. It can provide an one-time heavy capital grant to start the PIS, then, for every five-year budget, it can contribute its mite as State Govt. allotment both capital and recurring amount.
2.	Central Government	The Union Health Ministry can contribute atleast 25% of the PIS financial requirements. Also they can allot Special Grants for Special Projects or to create special infrastructure like e-Resources Cell, Digital Library etc.
3.	Participating Pharma Companies	The PIS should desire its membership. The member companies can pay the approved subscription and other related fees. They can also help in creating assets to PIS by way of donations, supply of computers, etc.
4.	Donars	Some industrial houses, individuals may be approached for some donations/gifts.
5.	Local Resource	The PIS can generate its own fund by way of (i) Service charges

		(ii) Library Membership fee (iii) Consultancy charges (iv) Sale of its Publications.
6.	Consortium Membership	The PIS may create e-Resources Consortium, to subscribe e-journals PIS needs fund, it can collect from the participating company the share to provide e-journals, e-databases distribution to them via-networks.
7.	Projects	Special proejcts may be workout and generate funds from project Agents like, ICMR (Indian Council of Medical Research), DST (Dept. of Sci. & Tech.), DBT (Dept. of Bio-Tech) and others.
8.	Seminars/Conferences/ Workshops/Trainings	The PIS can conduct seminars/ conferences on current trends and save some money. It also can design, prepare course materials and conduct anticipated/on demand workshops/ training programmes. By this PIS can charge fees and save some money.

6.3.13 PIS-Web - page

The Web Information space is rapidly growing in size and diversity of both its data and its clientele. A consequence is that Web Information System (WIS) in may applications replace existing traditional (not-web-based) information system. Since the nature of WIS differs from the nature of traditional information systems, there is a strong demand for WIS. Also from our study it is understood that, majority of the respondents demand new ICT

based information services. Hence the PIS Web Information Service (PIS-WIS).

The (PIS-WIS) will have all possible information which are electronic in nature (e-Resources). This service will be a part or one of the important value based services of PIS, besides all other document based services, hence the PIS will be an HYBRID one.

The most evident differences between WIS and traditional (non-web) information systems is that the large amount of information is organized in a web structure that is realized via (hyper) links that are available to a large number of potential end-users.

The most recent development in information package and dissemination activities is also the "web page" development, hosting and updation. The full view of functions and activities of any organization would reflect through its web-page or most commonly called "home-page". Designing and developing a web-page for PIS is one of the important activities of the proposed PIS for achieving its goals of information transfer and exchange with pharmaceutical industries. The proposed PIS web-page will have the following information / databases on its content for dissemination.

1. Information about PIS organizational structure
2. List of PIS Services.
3. Govt. polices, rules and regulations with respect to pharmaceutical Industry

4. PIS membership list, new member information.
5. Membership particular of pharmacy council.
6. Directory of Pharma Industries
7. Directory of Pharma Experts/ Consultants.
8. Directory of World Wide pharma organizations.
9. New Drug / Medicine announcement.
10. Information about related associations and their activities.
11. Subject Gateways for pharma companies.
12. Local Databases Services.
13. Union catalogue of books, journals and other non-book materials of member companies.
14. Announcement of new addition of new resources of PIS.
15. Journal articles aggregate,
16. Any other information relevant to PIS

6.4 Prototype Web Page for PIS

Keeping in view the above discussions described elsewhere in the previous chapters and sections, a prototype web page for PIS has been designed and practically developed using open source softwares. The same is described in the following sections.

6.4.1 Opening Screen

The opening screen of Prototype Web Page of the Pharmaceutical Information System is shown in Figure 6.7.

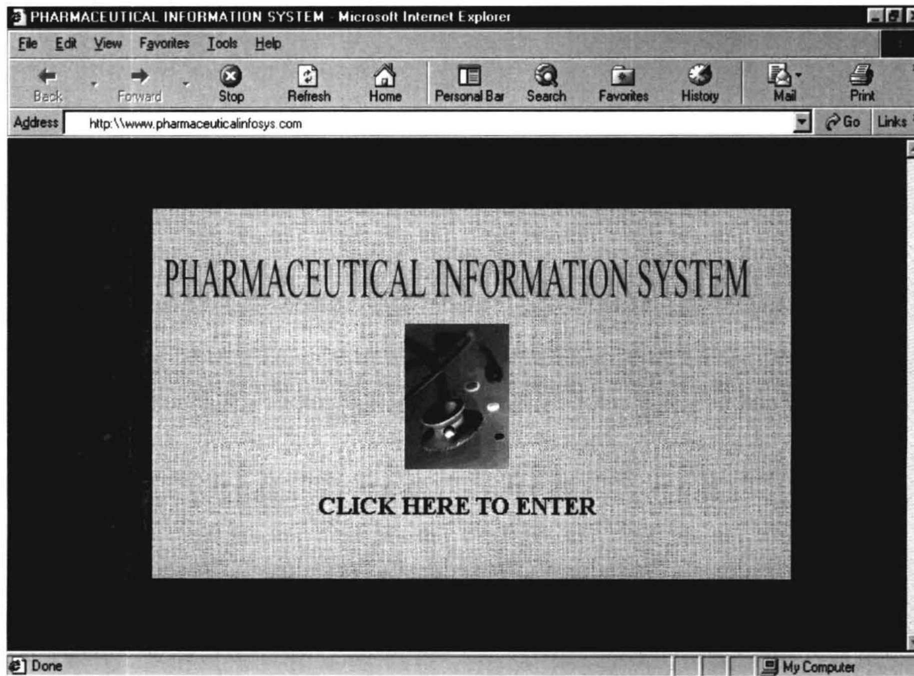


Fig. 6.7: Opening Screen of PIS Web Page

On clicking the Opening screen, the screen as shown in figure 6.8 can be seen which facilitates for further navigation.

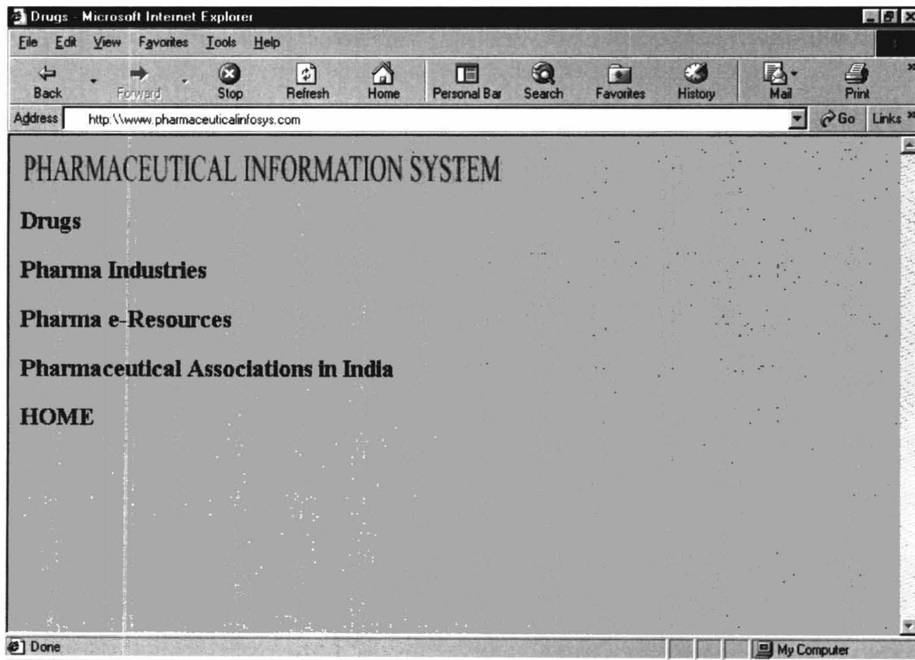


Fig. 6.8: Pharmaceutical Information System Menu Screen

The Pharmaceutical Information System provides information about Drugs; Pharma Industries in Chennai; Pharma e-Resources; Pharmaceutical Associations in India. On clicking each option leads to subsequent screens.

The figure 6.9 shows the content such as Drug Information Sites, Drug Controllers in India, on drug menu

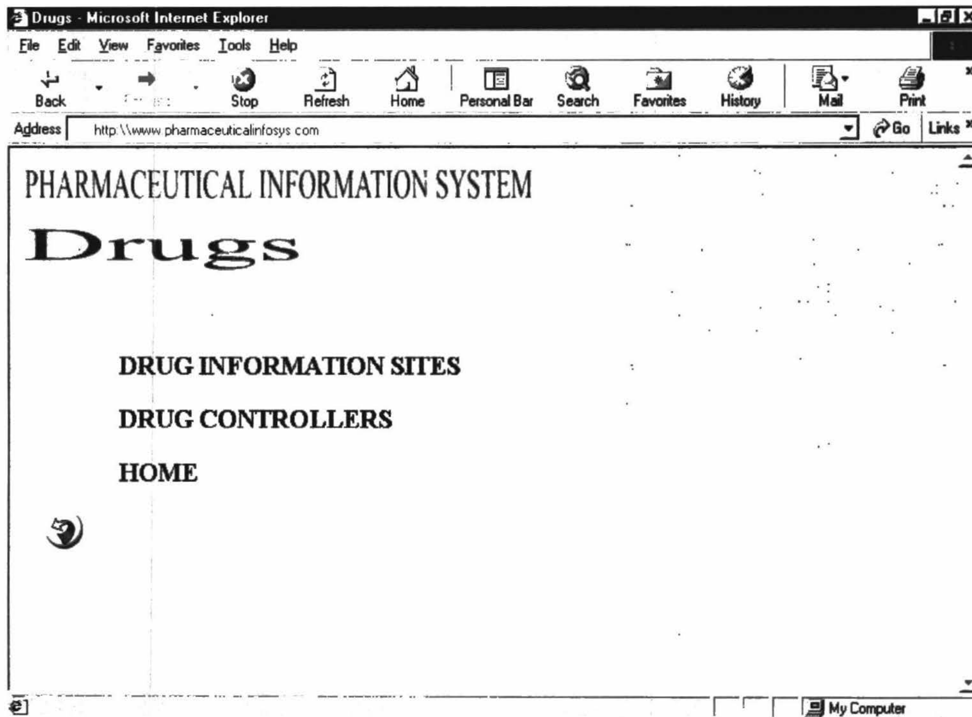


Fig 6.9: Drug Controllers Menu

The sample drug information site is shown in figure 6.10

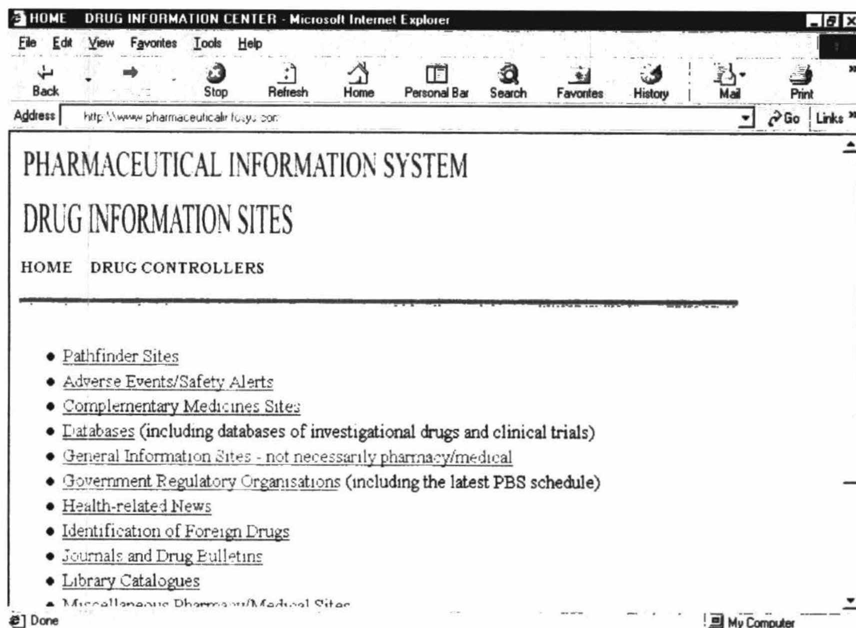


Fig 6.10: Drug information sites

The Pharmaceutical Information System also provides details about pharma industries in India. The Pharma Industries are further categorised and the same is shown in figure 6.11. To the major extent complete details are furnished.

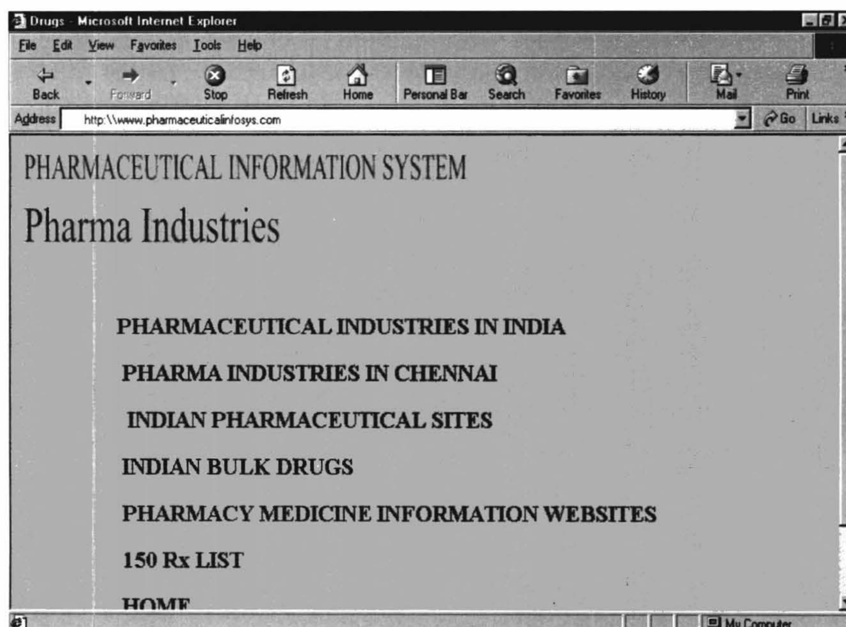


Fig 6.11: Pharma Industries Menu

The Figure 6.12 shows the linkage to Indian Pharmaceutical Sites

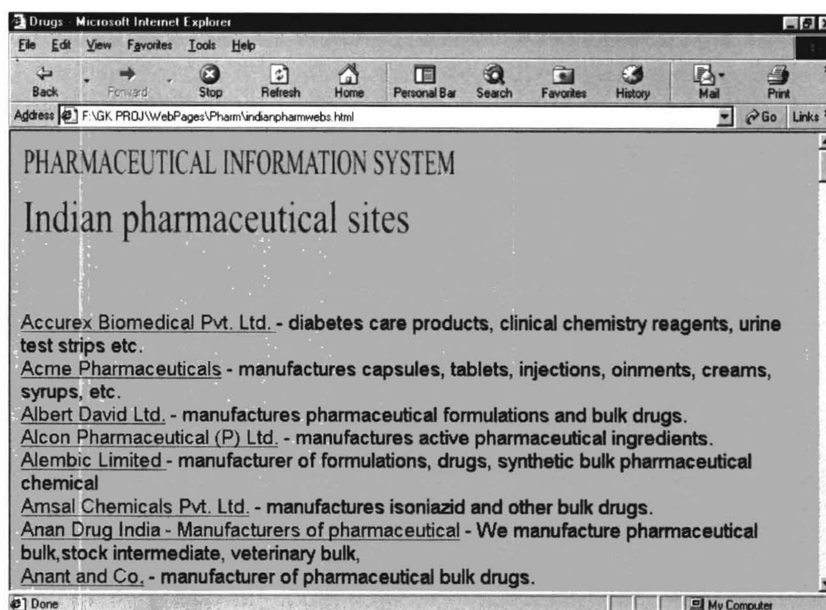


Fig. 6.12: Indian Pharmaceutical Sites Menu

The pharmacy medicine information websites are also included in Web Page of the Pharmaceutical Information System and the same is shown in figure 6.13.

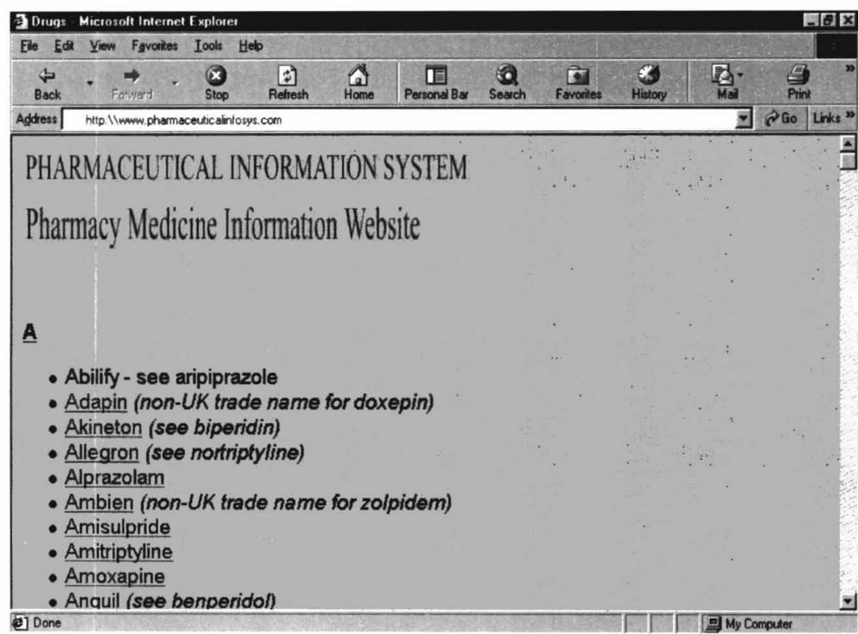


Fig 6.13: Pharmacy Medicine Information Website Menu

The Web Page of the Pharmaceutical Information System contains the pharma e-resources too and the same is shown in figure 6.14.

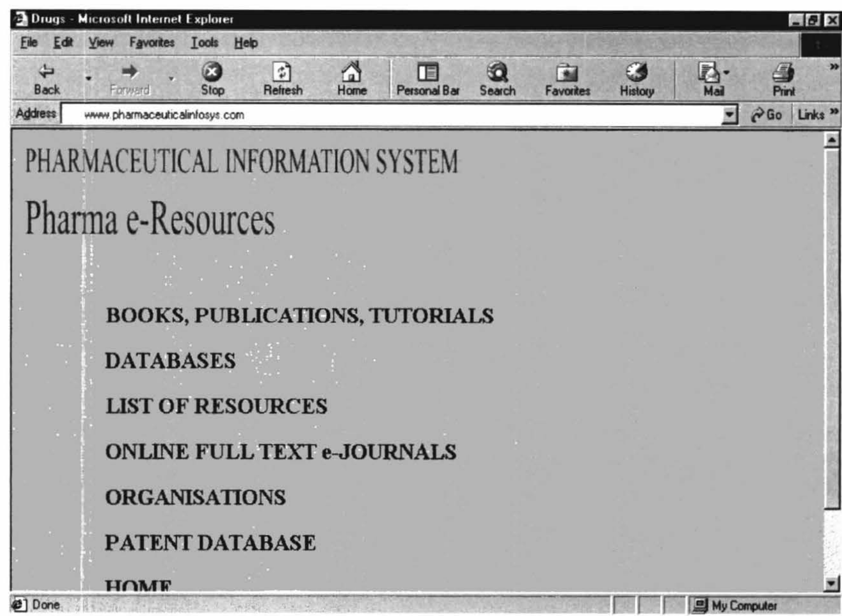


Fig 6.14: Pharma e-Resources Menu

Further, in this Web Page of Pharmaceutical Information System, international organizations link also included and the screen format for the same is shown in Figure 6.15.

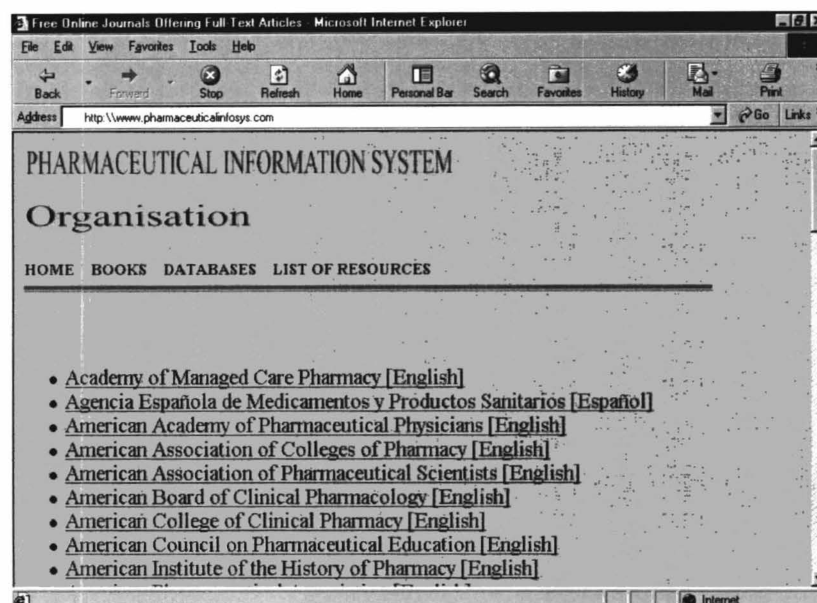


Fig.6.15: Pharma Organisation Menu

Patents, a base for Pharma industries are also taken into consideration and added in this prototype design, and the menu is shown below in Fig.6.16.

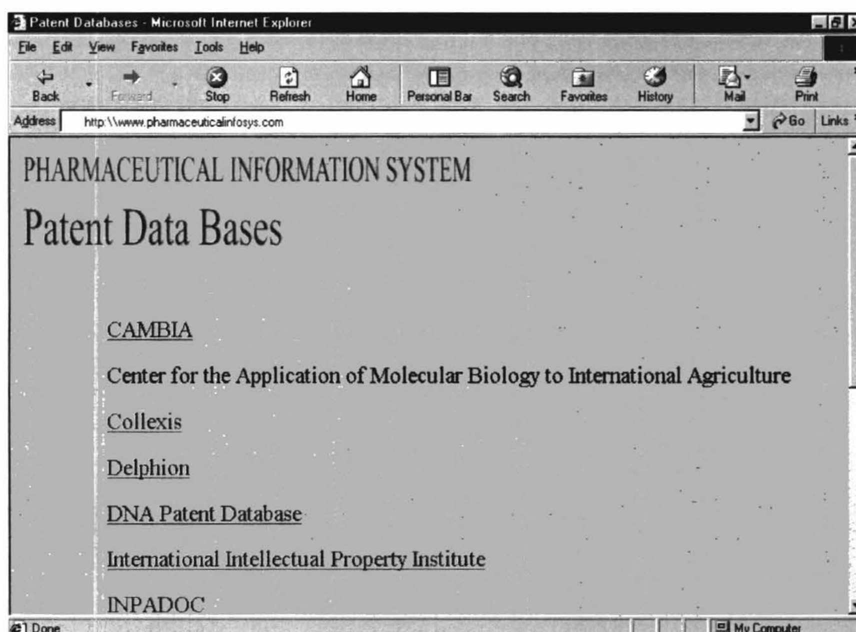


Fig. 6.16: Patent Information Menu

A Pharmaceutical Information System is not complete if it does not include Associations pertaining to that industry. Hence, the list of Pharmaceutical Associations of India are also included and the menu for the same is shown in figure 6.17.

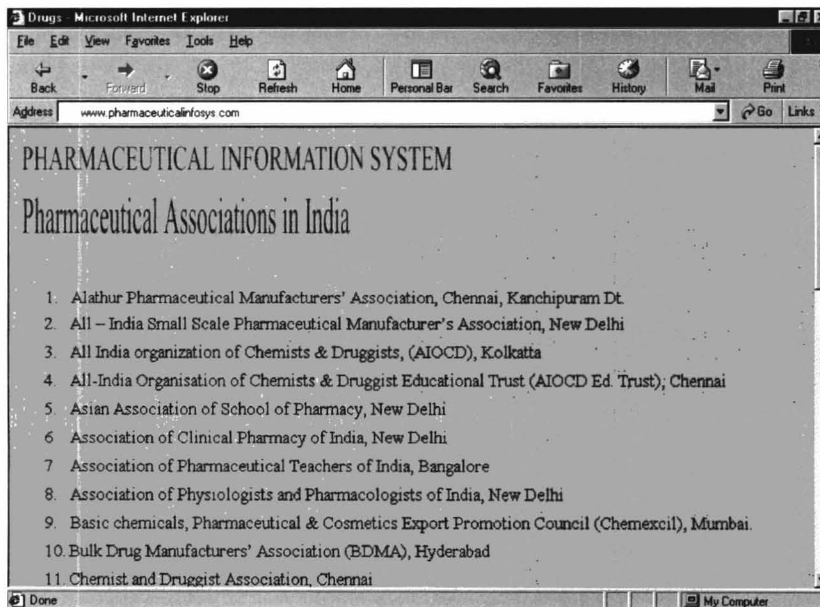


Fig. 6.17: Pharmaceutical Associations in India Menu.

The prototype model also provides links to books, publications, tutorials related to Pharmaceutical Industries and the menu is shown in figure 6.18.

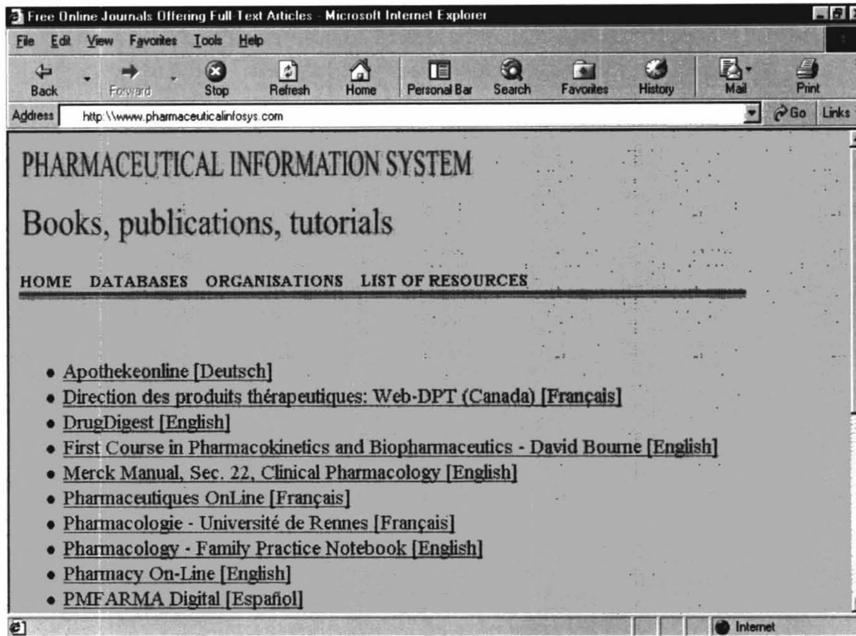


Fig. 6.18: Books, Publications, Tutorials link menu

Further, the related pharmaceutical databases are also linked in the prototype design. The figure 6.19 shows the alphabetical listing of the databases.

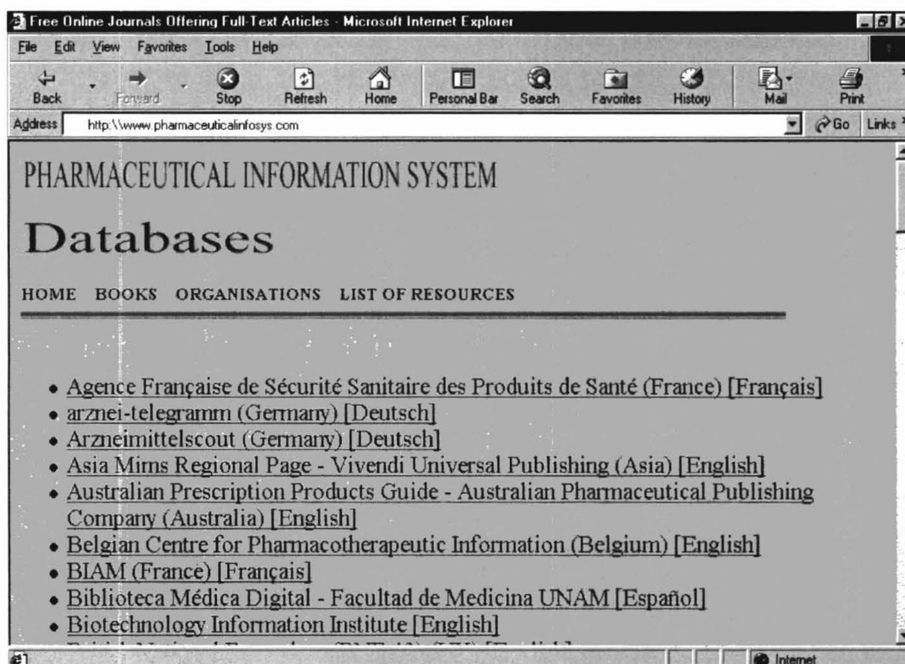


Fig. 6.19: Pharmaceutical Databases Menu

The Figure 6.20 shows the alphabetical listing and linkages to Pharmaceutical organizations. From the figure it can be seen that organizations belonging to different countries and languages are also linked. Therefore the prototype design is in order and acceptable.

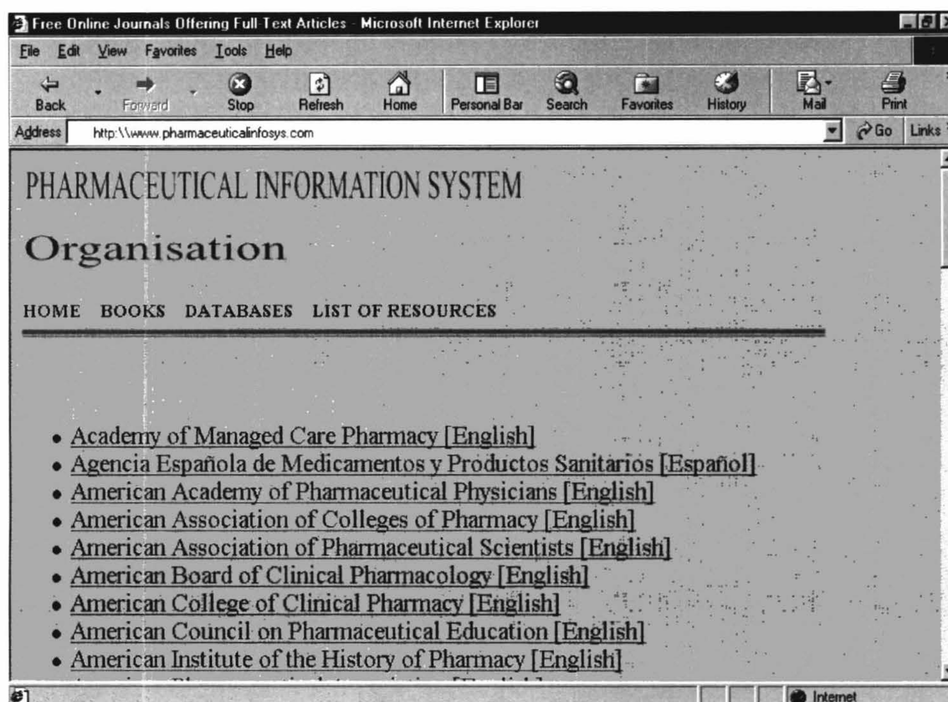


Fig. 6.20 Pharmaceutical Organisations Menu

A thorough knowledge of Pharmaceutical and drug Information is an important aspect of the medical information system. Keeping an upto date and fair knowledge about a subject by the individuals seems to be a difficult task. However Computerised databases are available to solve such problems. These type of information scattered in different web sites. The scattered information is grouped together and the web page for Pharmaceutical Information System has been designed. It can further be developed as Web portal for pharmaceutical industry.

6.5 SUGGESTIONS FOR FURTHER RESEARCH

The following researches suggest themselves as the natural corollaries of the present research. The suggested researches may enhance the understanding of the Pharmaceutical Information System in full perspectives.

1. The existing drug and pharmaceutical information system may be studied for their structure, functions and services which will give a scope to understand the system well for further development.

2. A study of the economics and costs of Pharmaceutical Information System (PIS) may be taken up. Cost effectiveness of the systems and services may also be evaluated with respect to such services and uses.

3. A detailed working model of PIS may be prepared with all inputs for actual implementation.

4. The proposed prototype Web Page for PIS may be taken up for complete development of the same for better dissemination of information for Pharma industry as a Web Portal.

Annexure I

ANNEXURE I

QUESTIONNAIRE FOR ASSESSING INFORMATION NEEDS OF PHARMA INDUSTRIAL ORGANISATIONS

* Please tick mark (√) against item(s) which is/are appropriate for you.

A. ORGANISATION/ COMPANY PROFILE

A.1. Name of the Organisation /Company: ____________________________

____

____

A.2 ***Address:***____

____

City: _______________________ Pin: _________________________

Phone: ______________________ E-mail ______________________

Web Address: ____

A.3 Year of Establishment :

____

A.4 ***Type of Organisation/ Company***

☐ Bulk Drugs mfrs. ☐ Sterile mfrs. ☐ R & D Centre/Lab.

☐ Intermediates ☐ Pharmacy practice ☐ Drug Testing Lab/ Centre

☐ Herbal Products mfrs. ☐ Formulations mfrs.

A.5 ***Products / Activities***

☐ Tablets ☐ Capsules ☐ Creams ☐ Injectables

☐ Liquid Orals ☐ Cosmetics ☐ Ointments ☐ Eye Drops /Lotions

☐ Food Products

☐ Any others (please specify) ______________________________

A.6 ***Staff Structure***

R&D staff	:	☐	Nos.
Administrative staff	:	☐	Nos.
Technical (Production, QA&QC)	:	☐	Nos.
Managerial staff	:	☐	Nos.
Library staff	:	☐	Nos.
Trainees	:	☐	Nos.
Others ________________	:	☐	Nos.

A.7 ***Do your organisation a member of any of the following*** **:**

IPA ☐ IDMA ☐

OPPI ☐ PMA ☐

Others (Pl. specify) ____

A.8 ***Kindly mention the library facility of your Organisation/Company***

☐ Separate oraganised library ☐ A store of books on cupboards

☐ Individual holdings/collection ☐ No library concept

B. PERSONAL DATA

B.1 ***Name*** **:** ____

B.2 ***Designation*** **:** ____

B.3 ***Department/Division:***____

B.4 ***Qualifications:*** ____

B.5 ***Field of Specialisation***: ____________________________

B.6 ***Age***: ☐ 21-30 Yrs. ☐ 31-40 Yrs. ☐ 41-50 Yrs. ☐ 51-60 Yrs. ☐ 60+ Yrs.

B.7 ***Experience in your area of activities***

☐ 1-5 Yrs. ☐ 6-10Yrs. ☐ 11-15 Yrs. ☐ 16-20 Yrs. ☐ 20 + Yrs.

B.8 ***Address:***____

____

Personal e-mail --
ID: ______________________________________

Phone:____________________ Mobile: ____________________

B.9 ***Publications / Research***

Research papers	☐	Nos.
Short communications	☐	Nos.
Books / Conference Proceedings	☐	Nos.
Reports	☐	Nos.
Patents	☐	Nos.
Ph.D. Guided	☐	Nos.
Consultancy done	☐	Nos.
Workshop / Training attended	☐	Nos.
Conference attended	☐	Nos.

B.10 ***Please list the Associations / Bodies etc. of which you are a member?***

____

____

C. NFORMATION AWARENESS / CHANNELS

C.1 Internal Channels of Information

In the first column, please √mark the channels listed below that you have used in the past two years for your work. Also in the second column, please rank the **THREE** most important in descending order (the most important is 1, etc.).

Information channels within your firm	Used in past two years	Order of importance
In-house library facilities	[ ]	[ ]
Company Internet facility	[ ]	[ ]
Personal knowledge, experience or experimentation	[ ]	[ ]
Other personnel in your organisation/ company	[ ]	[ ]
Company meetings, courses, workshops, etc.	[ ]	[ ]
Company sponsored R&D Projects	[ ]	[ ]
Formal Company reports, manuals, documents etc.	[ ]	[ ]

Others (please specify)____________________________________

C.2 External Channels of Information

In the first column, please√ mark the external channels (outside your oraganisation) listed below that you have used in the past two years for your work. Also, in the second column please rank the **FIVE** most important in descending order (the most important is 1, etc.).

External Channels of information (outside your company)	Used in past two years	Order of importance
Supplier or Vendor personnel	[ ]	[ ]
Trade Catalogues etc.	[ ]	[ ]
Universities / Institutions / Drug Inform. Centres	[ ]	[ ]
Libraries (other than personal or in-house lib)	[ ]	[ ]

Conventions / Conference / workshops etc	[ ]	[ ]
Books (textbooks, reference books etc.).	[ ]	[ ]
Professional Journals	[ ]	[ ]
Abstracting and indexing Services	[ ]	[ ]
Govt. Publications, Manuals etc.	[ ]	[ ]
Company Manuals	[ ]	[ ]
Patents/Reports	[ ]	[ ]
Standards/Specifications	[ ]	[ ]
Mass Media-Newspapers, TV etc	[ ]	[ ]
Professional Societies, Industrial Associations	[ ]	[ ]
Formal Courses, Training etc.	[ ]	[ ]
Formal Information Dissemination Centres	[ ]	[ ]

Others (Please list) ____________________________________

C.3 How often you collect information?

[ ] Occasionally [ ] Regularly [ ] Need based

C.4 How do you seek/collect information required by you?

[ ] Phone [ ] Correspondence [ ] E-mail [ ] Internet [ ] Visits

C.5 Are you satisfied with the information you collect? **Yes/No**

a) *If **Yes,*** [ ] Always satisfied [ ] Most often satisfied [ ] Generally satisfied [ ] Seldom satisfied

*b) If **No,** Why? The information is*:
[ ] Unorganised [ ] Partially available [ ] Lack of complete Information

( ) Any other (Please specify)____________________________________

C.6 ***Are you getting the required information in time?*** ***Yes / No***

*If **No**, What are the reasons in your opinion?*

( )	Distance	( )	Language	( ) Cost	
( )	Inefficiency in supply	( )	New Technology used		
( )	Non-availability	( )	Any other ____________________		

C.7 **a) *How long you take to collect information?*** | ***(b) Specify, how the collected Information is preserved/stored?***

One month	( )	Personal File	( )
Six months	( )	Cards/Paper form	( )
One Year	( )	Computer Storage	( )
More than a Year	( )	Unorganised	( )

C.8 ***What will be your purpose of reading/referring? Please rank the FIVE most important in descending order (the most important is 1, etc.).***

To keep knowledge up-to-date	( )
To do research work	( )
To improve the quality of your work	( )
To solve your technical problems	( )
To get market information	( )
To know the availability of technology	( )
To buy or contract new technology	( )
To improve the R & D at your company	( )
To collaborate in Research Work	( )
To popularise your inventions / products	( )
To transfer the technology of your Organisation	( )
To refine the existing products/processes	( )
To diversify your products	( )

C.9. **a)** How many hours in the last 60 days you would have spent in reading materials? (Books, Journals etc.,)

1. Reading at Library ____________ hrs.
2. Reading at work ______________ hrs.
3. Reading at home ______________ hrs.
4. Reading at other places _________ hrs.

b) ***What would be your time of reading/referring?***

( ) Morning ( ) Day Time ( ) Evening

( ) Night Time ( ) Holidays ( ) Any Time

C.10. ***a) How many hours in the last 60days you would have browsed information through INTERNET?*** _______________**hrs.**

b) You use Internet facility at:

( ) your home ( ) your office ( ) outside source

D. ORGANISATION /COMPANY LIBRARY FACILITIES

D.1. Do your organisatrion/company has a library Yes / No

D.2. If you have a Librarian/Library staff kindly mentioned their name/designation in order of hierarchy.

____

____

____

____

____

Otherwise kindly mention who is managing your library facilities:

____

D.3 ***Library collection***

a)	Book Collection	☐ Nos.
b)	Reference Book Collection	☐ Nos.
c)	Conference Proceedings Collection	☐ Nos.
d)	Standards Collection	☐ Nos.
e)	Patents collection	☐ Nos.
f)	Technical reports / manuals collection	☐ Nos.
g)	Microfilm collection	☐ Nos
h)	AV Material collection	☐ Nos.
i)	CD Collection	☐ Nos.
j)	Reprint collection	☐ Nos.
k)	Trade catalogue collection	☐ Nos.
l)	Business digest collection / IDR / CIMS / Drug Index	☐ Nos.
m)	Govt. publications collection /IP/BP/USP/EP/HP/VP	☐ Nos.
n)	Others (Pl. specify) ________________________________	

D.4 ***Library Budget***

Year:	2000-01	2001-02	2002-03
Amount:(Rs.)	________	____________	__________

D.5 ***Whether your library is computerised:*** ***Yes / No***

- ☐ Book catalogue indexed
- ☐ Membership records created
- ☐ Computerised book lending
- ☐ Barcode applied
- ☐ Book ordering
- ☐ Periodicals controlled
- ☐ Stock verification
- ☐ Library statistics
- ☐ Others works (Pl. specify) ________________________________

D.6 ***Do you have?***

Local Area Network	Yes/ No
Internet connection	Yes /No
E-mail service	Yes /No
WebPage of your company	Yes / No

D.7 Do your library/ Organisation have the following information services?

If yes, Kindly give weightage of <u>usefulness</u> 1 – 5,(5 being the highest weightage)

		Weightage
Online search service	Yes / No	[ ]
CD- ROM search service	Yes / No	[ ]
Internet service	Yes / No	[ ]
E-mail service	Yes / No	[ ]
OPAC (Online Public Access Catalogue)	Yes/No	[ ]
Web based service	Yes/No	[ ]
<u>*Special databases service*</u>		
E-journals	Yes / No	[ ]
MEDLINE	Yes / No	[ ]
PHARMLINE	Yes / No	[ ]
POISINDEX	Yes / No	[ ]
Chemical Abstract	Yes / No	[ ]
Biological Science Abstract	Yes / No	[ ]
IPA	Yes / No	[ ]
DRUGINDEX	Yes / No	[ ]
CANCERLIT	Yes / No	[ ]
MAPA	Yes / No	[ ]
PATENTS	Yes / No	[ ]
Others (Pl. specify)___________	Yes / No	[ ]

D.8 ***Is your library providing the following conventional library services also? Yes/No***

Book lending service	Yes / No
Inter library loan	Yes / No
CAS (Abstracting / Indexing services)	Yes/ No
Reference services	Yes / No
Referral services	Yes / No
Literature search services	Yes / No

Product Profile services	Yes / No
Translation services	Yes / No
Xerox service	Yes / No
Audio & Video service	Yes / No
User Education service	Yes/ No

D.9 ***How often do you use your Company Library?***

( ) Extensively ( ) Frequently ( ) Often ( ) Seldom ( ) Hardly

D.10 ***Please indicate your reason(s) for using your Company Library***

( ) For General reading ( ) To obtain information on a subject
( ) For reference work ( ) To collect statistical data
( ) For literature search ( ) To obtain specifications
( ) For technology information ( ) To collect market information
( ) Other reason(s) (Please specify) ____________________________

D.11. **a)** ***Are you satisfied with your Library collection/ services etc.,?***

( ) Always satisfactory ( ) Most often satisfactory
( ) Generally satisfactory ( ) Seldom satisfactory
( ) Always unsatisfactory

b) ***If unsatisfactory, please give your suggestions to improve your library*:**

____

____

c) ***Do you feel that your library subject collection is inadequate, for any of the subjects listed below :***

a.	Pharmaceutics	:	Yes / No
b.	Pharmaceutical Chemistry	:	Yes / No
c.	Pharmaceutical Technology	:	Yes / No
d.	Pharmaceutical Testing, Analysis & Control	:	Yes / No
e.	Pharmacology and Toxicology	:	Yes / No
f.	Herbal product Manufacture	:	Yes / No
g.	Pharmacy Practice	:	Yes / No

a. Community & Clinical Pharmacy : Yes / No

b. Patient Care : Yes / No

d) ***Do you suggest any specific books/series/periodicals/standards etc., to be added to the existing collection (please specify)***

____

____

____

e) Can you suggest/ name some of the databases you are interested to add to your library?

____

____

____

D.12.a.) Are you aware of the CDRI (Central Drug Research Institute, Lucknow), Regional Medical Informatic Centre and Drug Information Centre, Chennai (T.N) their Services. Yes / No

b.) If YES, have you ever used their information services? Yes / No
If **yes,** Please list some of the services you have used.

a) ____________________________
b) ____________________________
c) ____________________________

If **No,** what are the reasons? Cost [ ] or any other factor [ ] _________

D.13. a) ***Are you interested in the following innovative New Information Services?*** (available elsewhere (or) to be provided by your library in future) ***Yes / No***

If **Yes,** please rank the **SIX** services which you consider the most important for your work in descending order (the most important is 1.)

		Rank
1.	On-line Search Service	[ ]
2.	CD-ROM Search Service	[ ]
3.	E-Journals Service	[ ]
4.	Electronic Resources Consortium	[ ]
5.	Technology Information Service	[ ]
6.	R & D Project Information Service	[ ]

7. Products Profile Information Service [ ]
8. Newspaper Clippings Service [ ]
9. Literature Search & Bibliographic compilation Service [ ]
10. Selective Dissemination of Information Service [ ]
11. Patent / Standards Information Service [ ]
12. Project Information Package Service [ ]
13. NET Based Information Services [ ]

b) ***Are you willing to pay a nominal fee for the services of your choice, if provided to you?*** ***Yes / No***

c) ***If No, Your comments/suggestions please:*** ____________________________

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D.14. Do you h*ave any further comments/suggestions to offer on the kind of library services/facilities you would like to have in the future?*

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____

____

D.15. Overall, how would you rate your Company Library and its information facilities in providing you with helpful information for your purpose?

[ ] Excellent [ ] Very Good [ ] Good [ ] Fair [ ] Poor

D.16. ***Please provide, briefly any other information/suggestions/comments which you think would improve the library and information systems available at your Company Library in providing information for the scientific and technological progress of industries in general and your Company in particular:***

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Date: ____________________ ***Signature*** ____________________

Annexure II

ANNEXURE – II

VARIABLES INCLUDED IN THE QUESTIONNAIRE FOR ASSESSING INFORMATION NEEDS OF PHARMA INDUSTRIAL ORGANIZATIONS

Sl.No.	Code.	Description

A. ORGANISATION/ COMPANY PROFILE

Establishment

1.	YER	Year of Establishment

Type of Organisation/ Company

2.	BDM	Bulk Drugs Manufacturers.
3.	SM	Sterile Manufacturers.
4.	RDL	R& D Centre / Laboratories.
5.	INT	Intermediates
6.	PP	Pharmacy practice
7.	DTL	Drug Testing Laboratories.
8.	HPM	Herbal Products Manufacturers.
9.	FM	Formulation Manufacturers.

Products / Activities

10.	TAB	Tablets
11.	CAP	Capsules
12.	CMS	Creams

13	INJ	Injectables
14.	LOS	Liquid Orals
15.	COS	Cosmetics
16.	OINT	Ointments
17.	EDL	Eye Drops/ Lotions
18.	FP	Food Products
19.	OTS	Others

Staff Structure

20.	RDS	R&D Staff
21.	ADS	Administrative Staff
22.	TECH	Technical (Production, QA&QC) Staff
23.	MS	Managerial Staff
24.	LIBS	Library Staff
25.	TRA	Trainees
26.	OTH	Others

Membership in Professional Bodies

27.	IPA	Indian Pharmaceutical Association
28.	IDMA	Indian Drug Manufacturer's Association
29.	OPPI	Organisation of Pharmaceutical Producers of India
30.	PMA (TN)	Pharmaceutical Manufacturer's Association of T.N.
31.	OTH	Others

Library Facilities –Status

32.	SOL	Separate Oraganised library
33.	IHC	Individual holdings/collection
34.	SBC	A store of books on cupboards
35.	NLC	No library concept

B. PERSONAL DATA

Individual Profile

36.	DSG	Designation
37.	DIV	Department/Division
38.	QFN	Qualifications
39.	SPN	Specialization
40.	AGE	Age.
41.	EXP	Experience

Publications/ Research Activities

42.	RP	Research papers
43.	SC	Short communications
44.	BCP	Books / Conference Proceedings
45.	REP	Reports
46.	PAT	Patents
47.	PDG	Ph.D. Guided
48.	CD	Consultancy done
49.	WTA	Workshop / Training attended
50.	CA	Conference attended

C. INFORMATION AWARENESS / CHANNELS

Internal Channels of Information

51.	IHLF	In-house library facilities
52.	CIF	Company Internet facility
53.	PKE	Personal knowledge, experience or experimentation
54.	POC	Other personnel in your organisation/ company
55.	CMCW	Company meetings, courses, workshops, etc.
56.	CRDP	Company sponsored R&D Projects
57.	FCRMD	Formal Company reports, manuals, documents etc.
58.	OTH	Others

External Channels of Information

59.	SVP	Supplier or Vendor personnel
60.	TC	Trade Catalogues etc.
61.	UIDIC	Universities / Institutions / Drug Inform. Centres
62.	LIB	Libraries (other than personal or in-house lib)
63.	CCW	Conventions / Conference / workshops etc
64.	BKS	Books (textbooks, reference books etc.).
65.	PJ	Professional Journals
66.	AIS	Abstracting and Indexing Services
67.	GPM	Govt. Publications, Manuals etc.
68.	CM	Company Manuals
69.	PATREP	Patents/Reports
70.	STDS	Standards/Specifications
71.	MMNTV	Mass Media-Newspapers, TV etc
72.	PSIA	Professional Societies, Industrial Associations
73.	FCT	Formal Courses, Training etc.
74.	FIDC	Formal Information Dissemination Centres
75.	OOO	Others

Habit of Information collection

76.	OCC	Occasionally
77.	REG	Regularly
78.	NB	Need based

Media for Information collection

79.	PH	Phone
80.	COR	Correspondence
81.	EM	E-mail
82.	INET	Internet
83.	VIS	Visits

Information Satisfaction Rate

84.	AS	Always satisfied
85.	MOS	Most often satisfied
86.	GS	Generally satisfied
87.	SS	Seldom satisfied

Non –Collection of Information

88.	UNO	Unorganized
89.	PA	Partially available
90.	LC	Lack of complete information
91.	OTH	Others

Barriers to Information

92.	DIS	Distance
93.	LAN	Language
94.	COS	Cost
95.	IES	Inefficiency in supply
96.	NTU	New Technology used
97.	NA	Non-availability
98.	OOO	Others

Frequency of Information Collection

99.	OM	One month
100.	SM	Six months
101.	OY	One-Year
102.	MTY	More than a Year

Storage Form of Information

103.	PF	Personal File
104.	SM	Six months
105.	CPF	Cards/Paper form
106.	UNORG	Unorganised

Purpose of Information Seeking

107.	KKUP	Keep knowledge up-to-date
108.	RW	Research Work
109.	IQW	Improve the Quality of Work
110.	STP	Solve Technical Problems
111.	GMI	Get Market Information
112.	KAT	Know the Availability of Technology
113.	BNT	Buy or contract new technology
114.	IRDC	Improve the R & D at the Company
115.	CRW	Collaborate in Research Work
16.	PIP	Popularise Inventions / Products
117.	TTO	Transfer the Technology of the Organisation
118.	REPP	Refine the Existing Products/Processes
119.	DVP	Diversify Products
120.	OTH	Others

Hours of Reading

121.	RD	Reading at Library
122.	RW	Reading at work
123.	RH	Reading at home
124.	OTHP	Reading at other places

Time of Reading/Referring

125.	MON	Morning
126.	DT	Day Time
127.	EVN	Evening
128.	NT	Night Time
129.	HOL	Holidays
130.	AT	Any Time

Place of Internet Facility

131. HOM Home

132. OFF Office

133. OUTS Outside Source

D. ORGANISATION /COMPANY LIBRARY FACILITIES

Availability of Library

134. LIB Library facility

Library collection

135. BC Book Collection
136. RBC Reference Book Collection
137. CPC Conference Proceedings Collection
138. SC Standards Collection
139. PC Patents Collection
140. TMC Technical Reports / Manuals Collection
141. MC Microfilm Collection
142. AV AV Material Collection
143. CD CD Collection
144. RC Reprint Collection
145. TCC Trade Catalogue Collection
146. BDC Business Digest Collection
147. GPC Govt. Publications Collection
148. OTH Others

Library Automation

149. BCI Book catalogue indexed
150. MRC Membership records created
151. CBL Computerised book lending
152. BA Barcode applied
153. BO Book ordering
154. PC Periodicals controlled

155. SV Stock verification
156. LS Library statistics
157. OW Others works

Library Network Facility

158. LAN Local Area Network
159. INC Internet connection
160. EMS E-mail service
161. WEB Web Page of the company

Library Computer based Services

162. OSS Online search service
163. CDSS CD- ROM search service
164. INS Internet service
165. EMS E-mail service
166. OPAC Online Public Access Catalogue
167. WBS Web based service

Special databases services

168. EJL E-journals
169. MLINE MEDLINE
170. PLINE PHARMLINE
171. PIND POISINDEX
172. CA Chemical Abstract
173. BSA Biological Science Abstract
174. IPA International Pharmaceutical Abstract
175. DIND DRUGINDEX
176. CAN CANCERLIT
177. MAPA Medicinal Aromatic Plants Abstract
178. PAT PATENTS
179. OOO Others

Conventional Library Services

180.	BLS	Book lending service
181.	ILL	Inter library loan
182.	CAS	Current Awareness Services
183.	RES	Reference service
184.	RRS	Referral service
185.	LSS	Literature search service
186.	PPS	Product Profile service
187.	TS	Translation service
188.	XS	Xerox service
189.	AVS	Audio & Video service
190.	UES	User Education service

Company Library-Utility Pattern

191.	EXT	Extensively
192.	FRE	Frequently
193.	OFT	Often
194.	SEL	Seldom
195.	HAR	Hardly

Company Library-Use Purpose

196.	GR	General reading
197.	INFS	Information on a subject
198.	RW	Reference work
199.	CSD	Collect statistical data
200.	LITS	Literature search
201.	OS	Obtain specifications
202.	TI	Technology information
203.	CMI	Collect market information
204.	OTH	Others

Company Library Collection- Satisfaction

205. AS Always satisfactory
206. MOS Most often satisfactory
207. GS Generally satisfactory
208. SS Seldom satisfactory
209. AU Always unsatisfactory

Company Library Collection-Subject distribution

210. PCE Pharmaceutics
211. PHC Pharmaceutical Chemistry
212. PHT Pharmaceutical Technology
213. PTAC Pharmaceutical Testing, Analysis & Control
214. PHTOX Pharmacology and Toxicology
215. HPM Herbal product Manufacture
216. PP Pharmacy Practice
217. CCP Community & Clinical Pharmacy
218. PC Patient Care

Special Information Centres

219. CDRI Central Drug Research Institute
220. RMIC Regional Medical Informatic Centre
221. DIC Drug Information Centre

New Information Services -Need

222. OLSS On-line Search Service
223. CDSS CD-ROM Search Service
224. EJLS E-Journals Service
225. ERC Electronic Resources Consortium
226. TIS Technology Information Service
227. RDP R & D Project Information Service
228. PPIS Products Profile Information Service
229. NCS Newspaper Clippings Service

230.	LSBS	Literature Search & Bibliographic Compilation Service
231.	SDIS	Selective Dissemination of Information Service
232.	PSIS	Patent / Standards Information Service
233.	PIPS	Project Information Package Service
234.	NIS	NET Based Information Services

Information Fee

235.	NFI	Normal Fee for Information

Company Library –Overall rating

236.	EXC	Excellent
237.	VG	Very Good
238.	GD	Good
239.	FAI	Fair
240.	POO	Poor

Annexure III

ANNEXURE – III

LIST OF PHARMACEUTICAL INDUSTRIES IN AND AROUND CHENNAI

1. Abilash Pharma Private Ltd,
   No. 1, kanniamman Koil St.
   Shenoy Nagar,
   Chennai –600 030
   Tel: 6471624

2. Alved Pharma & Foods Pvt Ltd.
   Plot No. 549, IV Sector, 14th St.
   K.K. Nagar, Chennai – 600 078
   Tel: 4834885/4836279/4816874 / 4723542, Fax: 4838344
   E-mail: alved@vsnl.com

3. Apex Laboratories Ltd.
   38 C P Ramaswamy Road
   Alwarpet, Chennai –600 018
   Tel: 4998297/4998236/4998235
   Fax: 4997254
   E-mail: apex@md2.vsnl.net.in

4. Arvind Remedies Ltd.
   190 Poonamallee High Road
   Chennai – 600 084
   Tel: 6423264/6423265
   Fax: 6423265
   E-mail: arl@eth.net
   Arvindrem@eth.net

5. Arlab India Pvt. Ltd.
   B.24, SIDCO Pharmaceutical Complex,
   Alathur – 603 110
   Tel:466268/466353/466952

6. Dr. Agarwal's Pharma Ltd.
   Old No. 13, New No.19
   Cathedral Road,
   Chennai- 600086
   Tel: 8112592/8116233/8112959
   Fax: 8115871
   E–mail:
   agarwal@giasmd01.vsnl.net.in

7. Amurthanjan Ltd.
   42 & 45 Luz Church Road
   Mylapore, Chennai – 600 004
   Tel: 499146/4164/4465
   Fax: 4994585
   E-mail:
   amrutanjan@md2.vsnl.net.in

8. Aeon Therapeutics (India) Pvt Ltd.
   77 & 78, 6th Street,
   Kavignar Kannadasan nagar
   Ramapuram, Chennai – 600 089
   Tel: 2491193/2494851

9. Ashok Pharmaceuticals
   52, Orms Road, Kilpauk
   Chennai – 600 010
   Tel: 6444766
   Fax: 4732426
   E-mail: ashokpharma@vsnl.com

10. Anjan Drugs Pvt Ltd.
    Plot No. 109 & 116, SIDCO
    Pharmaceutical Complex,
    Old Mahabalipuram Road
    Alathur – 603 110
    Tel: O: 3745778/3743941
    Fax: 3745779

11. Astoria Research & Analytical
82 Anna Salai, Guindy,
Chennai – 600 032
Tel: 2341786; Fax: 2348426

12. Alovap Pharma
Pharmaceutical Manufacturers
9A, Sangam Road, Lakshmipuram
Chennai – 600 044. Tel: 2402959

13. AtoZ Pharmaceuticals (P) Ltd.
12 Balaji Nagar, Ambattur,
Chennai - 600 053
Tel: 6585811/658855
E-mail: omsoc@md2.vsnl.net.in

14. Associated Tablets & Capsules
Phase-III, Thiru-Vi-Ka Indl. Estt.
Chennai – 600 097
Tel: 2321595

15. Axon Drugs Pvt.Ltd.
242, Kilpauk Garden Road
Chennai – 600 010
Tel: 6445676/6272930

16. Aristo Pharmaceuticals Ltd.
Post Box No. 843, M-1,
TVK Indl. Estt.
Guindy, Chennai – 600 032
Tel: 2316708/2345892
Fax: 231670
E-mail: aplmas@vsnl.com

17. Alfred Berg & Co. (India) Pvt Ltd.
No.1 Hunters Road
Chennai – 600 112
Tel: 5321973/5322124
Fax: 5322124

18. Amarchand Sobachand (Madras)
117, Nyniappa Naickan St
Chennai – 600 003
Tel: 5354020; Fax: 5322873

19. Arihaant Pharma
6/1, Valluvar Salai,
Ramapuram, Chennai – 600 089
Tel: 2491913/2492392

20. Amber Chemicals & Pharmaceuticals
5th floor, Nelson Tower, II Wing
117, Nelson Manikam Road
Chennai – 600 029
Tel: 3745778

21. Biotrans Pharmacueticals P Ltd.
3. New Natarajapuram II St.
MMDA Colony,
Chennai – 600 106
Tel: 6206892/6421766

22. Benson Drugs
No. 9 Chari Road, Shenoy Nagar,
Chennai – 600 030
Tel: 6206892/6421766

23. Bafna Pharmaceuticals ltd.
299 Thambu Chetty Street,
Chennai – 600 001
Tel: 5267517/5270992
Fax: 5231264
E-mail: bafna@md3.vsnl.net.im

24. Brown & Burk Pharmaceuticals Ltd.
Flat No.S1, Ground floor,
Sindhoor Gardens
423, Kilpauk Garden Road
Chennai: 600 010:
Tel: 6450789/644038
Fax: 6479965

25. Bergy Laboratories
143, Mahatma Gandhi Road,
Kumaran Nagar, Padi,
Chennai – 600 050
Tel: 6542169

26. Baba Herbal Labs & Nature care Research Centre
'O' Block, 136 Ganapathy colony
Anna Nagar East,
Chennai – 600 102
Tel: 6282050

27. Chemech Laboratories Ltd.
"Fagun Chambers"
4, III Floor, 26 C-in-Chief Road
Chennai – 600 105
Tel: 8221510/11; Fax: 8255703
E-mail: chemech@md4.vsnl.net.in

28. Citadel Fine Pharmaceuticals Ltd.
43, Main Road, Velachery,
Chennai – 600 042
Tel: 2451623/2451027
Fax: 2450037
E-mail: nalgis@vsnl.net.in

29. Citadel Fine Pharmaceuticals Pvt Ltd.
265, TTK Road, III Floor,
Alwarpet, Chennai – 600 018
Tel: 4992267; Fax: 4992220
E-mail: citadelfine@vsnl.com

30. C.F. Pharmaceuticals
43, Velacherry Main Road
Velacherry, Chennai-600 042
Tel: 2451623, Fax: 2450037

31. Chemind Pharmaceuticals
617, Door No.5, 51st Street,
9th sector, K.K.Nagar,
Chennai – 600 078.

32. Comprehensive Medical Services India
Post No. 988, Manapakkam East,
Chennai – 600 089
Tel: 2493876, Fax: 2493379

33. Curekraft Chemicals India (P) Ltd.
C-9, Industrial Complex,
Maraimalai Nagar,
Chengleput – 603 209
Tel: 04114 – 452293, Fax:454831
E-mail: curekraft@vsnl.net.in

34. Caplin Point Laboratories Ltd.
86 Bazullah Road
T. Nagar, Chennai – 600 017
Tel: 8278567 / 8269993
Fax: 8212284
E-mail: tricap@md3.vsnl

35. Central Drugs & Pharmaceuticals
No.3, Multi Industrial Estate,
Girugambakkam,
Chennai – 602 101. Tel: 4852511

36. Carewell Phaarma
9. Nagi Reddy Gardens
Guindy, Chennai- 600 032
Tel: 2325754, Fax: 2320343

37. Clinichem Pharmaceuticals P Ltd.
105A, Dr.Radhakrishnan Road
Mylapore, Chennai- 600 004
Tel: 8473449 /8471009
Fax: 8473749
E-mail: clinic-chem@hotmail.com

38. Capwin Labs
Plot No.44, Door No.12
Velavan Street, Kamakodi Nagar Annex, Valasaravakkam,
Chennai – 600 087. Tel: 4863998

39. Castle Research Labs. Pvt.Ltd.
PK19, Phase-5, Industrial Estate
Ekkattuthangal,
Chennai – 600 097
Tel: 2323280 / 2311628
E-mail:
cassel@giasmd01.vsnl.net.in

40. Commonwealth laboratories India Pvt Ltd.
18, Nesapakkam,
Mariamman Koil St.
West K K Nagar,
Chennai – 600 078
Tel: 4726762

41. Chennai Drugs & Pharmaceuticals
17, School Street, Sathya Nagar
Padi, Chennai – 600 050
Tel: 6259392 / 6521446

42. Dews Formulations
No.11, Krishna Street,
Senthamil Nagar, Ramapuram
Chennai – 600 089

43. Deo Pharmaceuticals
26-A, Shriram Nagar Trunk Road
Porur, Chennai- 600 116

44. Dollar Company Pvt. Ltd.
323 Old No. 156 Tambu Chetty St.
Andra Insurance Buildings
Chennai – 600 001
Tel: 5342456 / 5342868,
Fax: 5356427

45. Dravidanadu Drugs and Pharmaceuticals
20 Kalingaraya Street
Chennai – 600 021
Tel: 5227182 / 5243804
Fax: 5232060

46. Dynamic Formulations Chennai Pvt. Ltd.
70, Kavinagar Kannadasan Nagar
5th Street, Ramapuram,
Chennai –600 089
Tel: 4892922 / 4892079

47. Emkay Bio Products
120A, III Main Road,
Purushotham Nagar, Chromepet,
Chennai – 600 044; Tel: 2364698

48. Eucare Pharmaceuticals Pvt. Ltd.
5, 67th Street, Opp: District Library
Ashok Nagar, Chennai – 600 083
Tel: 4897816 / 4854089
Fax: 4744681
E-mail: eucare@vsnl.com

49. Eurochem Laboratories Pvt. Ltd.
70 Jermiah Road Vepery,
Chennai – 600 007; Tel: 5321782

50. East West Pharmaceuticals
37, Rukmani Nagar
Maduravoyal, Chennai – 602 102
Tel: 4790122

51. Ennar Pharmaceuticals
1/46, Vembuliamman Koil St.
Thoraipakkam, Chennai – 600 096
Tel: 4960210 (PP)

52. Fascimed Pharmaceuticals Ltd.
26/1, Jawaharlal Nehru Road
Senthil Nagar, Chennai – 600 94
Tel: 4732479; Telefax:4804426

53. F.D.C. Ltd.
B.20, Industrial Estate
Mugappair West,
Chennai – 600058
Tel: 6243825 / 6522807,
Fax: 6253667
E-mail: fdcchen@vsnl.net

54. Franco Indian Remedies Pvt. Ltd.
56, Nelson Manickam Road
Aminjikarai, Chennai – 600 029
Tel: 3725001 to 3
Telefax: 3745004

55. Fourrts (India) Laboratories Pvt.Ltd.
9A, 5th Main Road,
Bakthavastsalam Nagar, Adayar,
Chennai – 600 020
Tel: 4914573 / 4421930 / 4901110
Fax: 4915607
E-mail: fourrts@vsnl.com

56. Goldstein Laboratories
628 Poonamallee High Road
Arumbakkam, Chennai –600 106
Tel: 6214985 / 6280301
Telefax: 6204983

57. Gray Annon Formulations P Ltd.
41/1, karambakkam I Main Road
Karambakkam, Chennai- 600 116
Tel: 4766540

58. Gray Annon India Pharmaceuticals
3/119, Brahmin Street,
Karambakkam, Porur,
Chennai – 600 116
Tel: 4766478

59. Growell Pharmaceuticals
5/32, V.O.C. I Street
Kodambakkam,
Chennai – 600 024
Tel: 4839914

60. Heal India Laboratories Pvt. Ltd.
340, I Main Road, Natesan Nagar,
Chennai – 600 092
Tel: 4873325

61. Halsphere Remedies Pvt. Ltd.
85, Govindarajan Street
Karumariamman Nagar,
Valasaravakkam,
Chennai – 600 087
Tel: 4861843.

62. Indo French Laboratories Ltd.
19, III Main Road, Ram Nagar,
Nanganallur, Chennai – 600 061
Tel: 2342758 / 2342759
Fax: 23431626
E-Mail: indo61@md4.vsnl.net.in

63. I.C.I. India Ltd
Ennore Express Highway
Ennore, Chennai – 600 057
Tel: 5733707/ 5733808

64. Indian Medical Practitioners
Co-operative Pharmacy & Stores
34-37, Kaki Krishamurthy Salai
Thiruvanmiyur,
Chennai – 600 041
Tel: 4911029 / 4911189
Fax: 4913313

65. Indo Herbo Chemicals & Pharmaceuticals
18/24. Thiru Nagar, Phase –III
Villivakkam, Chennai – 600 049.
Tel: 6215765

66. Indian Drugs & Pharmaceticals Ltd.
Nandambakkam,
Chennai – 600 089
Tel: 2321803, Fax: 2321744

67. Indo Swiss & Pharmaceuticals
Plot No.80A, 6th Cross,
Ram Nagar
North Extension, Velacherry
Chennai – 600 042 Tel: 2443248

68. Innvol Medical India Ltd.
2B, III Main Road, Nehru Nagar,
Chennai – 600 020 Tel: 4910869

69. Jeevan Pharmaceuticals (P) Ltd.
No.1, Railway Colony I Street
Aminjikarai, Chennai – 600 029
Tel: 3741471

70. J.K. Pharmachem Ltd.
Khivraj Complex – II
5th Floor, 480 Anna Salai
Nandanam, Chennai – 600 035
Tel: 4320195 / 4320197
Fax: 4320198

71. Jaksun Pharmaceuticals
18, Ramakrishna Nagar Extn.
Valasaravakkam,
Chennai – 600 087
Tel: 4860653

72. Kniss Laboratories Pvt. Ltd.
No.12, Old No.9, II Floor,
18th Avenue,
Ashok Nagar, Chennai – 600 083
Tel: 4715608 / 4719671,
Fax: 4719671

73. Kausalya Pharmaceuticals (P) Ltd.
242, Kilpauk Garden Road
Kilpauk, Chennai – 600 010
Tel: 6461518 / 6474248,
Fax: 6441639

74. Kerlin Pharmaceuticals & Exports Ltd.
140, Indira Nagar,
Valasaravakkam
Chennai – 600 087 Tel: 4863156

75. Kodicil Formulations
Flat No.160/R-48, TVS Colony,
Anna Nagar West Extn.
Chennai – 600 101
Tel: 6543820

76. Laven Chemical Industries
139, Perumal Koil St.
Alapakkam, Chennai – 600 116
Tel: 4769226

77. Lalchand Bhimaj
11 Nyniappa Naicken Street
Chennai – 600 003
Tel: 5354424, Fax: 5354582

78. MMC Healthcare Ltd.
61 Fathima Nagar,
Valasaravakkam,
Chennai- 600 087
Tel: 4862612, Fax: 4814759
E-mail: mmchealthcare@vsnl.com

79. MMC Laboratories Pvt. Ltd.
61 Fathima Nagar,
Valasaravakkam,
Chennai- 600 087
Tel: 4862612, Fax: 4814759
E-mail: mmchealthcare@vsnl.com

80. Motherland Laboratories
4/81, III Street, Sathya Nagar
Manapakkam, Chennai – 600 089
Tel: 2492921

81. Medopharm
No.1. Thiru-vi-ka Road
Chennai – 600 006
Tel: 8520032 / 8586726
Fax: 8523457

82. Melody Drugs & Pharmaceuticals
H-70/1, Central Avenue
Korattur, Chennai – 600 080
Tel: 6250932

83. Max-Med Laboratories Pvt. Ltd.
166, Pallavan Street
Alwar Thiru Nagar
Chennai – 600 087

84. Mano Pharmaceuticals Pvt. Ltd.
447, Old No.265, P.H. Road
Aminijikarai, Chennai – 600 029
Tel: 644327 / 6447752,
Fax: 6445980
E-mail: manopharma@vsnl.com

85. Malladi Drugs & Pharma Ltd.
52, Jawarharlal Nehru Road
Ekkattuthangal,
Chennai – 600 097
Tel: 2345881 / 2340026
Fax: 2340104 / 2345884
E-mail: marketing@malladinic.com

86. Meridian Pharmaceuticals P Ltd.
14, Old Trunk Road, Pallavaram
Chennai – 600 043
Tel: 2402921, Fax: 2366964
E- mail: bhucorp@md2.vsnl.net.in

87. Mount Mettur Pharmaceuticals Ltd.
32, 9th Street, Dr. Radhakrishnan Salai, Mylapore,
Chennai – 600 004
Tel: 8472932 / 8472934,
Fax: 8472934
E-mail: mountmettur@eth.net

88. Mohan Pharma
129A Nyniappa Naicken Street
Chennai – 600 003
Tel: 5332431 / 5352758,
Fax: 5354759

89. Medispan Ltd.
Vijay Plaza, II Floor, C-32,
II Avenue
Anna Nagar, Chennai – 600 040
Tel: 6212717 / 6160843 / 5251467
Fax: 6216645 / 6358852
E-mail: medispan@giasmd01.vsnl.net.in

90. Madras Pharmaceuticals, The
18 Dr. Nair Road, T.Nagar
Chennai – 600 017
Tel: 8264556 / 8211391,
Fax: 8234013
E-mail: sulaiman@md2.vsnl.net.in

91. Maral Lab
137, Old Mahabalipuram Road,
Karappakkam, Chennai – 600 096
Tel: 4960112 / 4960421,
Fax: 4961334
E-mail: sulaiman@eth.net

92. Master Pharmaceuticals
New No. 2/104, Pillayar Koil St.
Thoraipakkam, Chennai – 600 096
Tel: 4960096 / 4960210

93. Mengal Laboratories
41, Orms Road
Chennai – 600 010
Tel: 6444766 / 4800426

94. Marcus Pharmaceuticals
67-A, 5th Street,
Kavignar Kannadasan Nagar
Ramapuram, Chennai – 600 089
Tel: 2490366

95. Medisat Remedies
1, Lalitha Gardens
Thiruvanmiyur, Chennai–600 041
Tel: 4418781

96. Micro Labs Ltd.
Flat S1, Ground Floor,
Sindoor Gardens,
423, Kilpauk Garden Road
Chennai – 600 010
Tel: 6449038 / 6450789,
Fax: 6479965
E-mail: chennai@microgrp.com

97. Medi Best Pharma Pvt. Ltd.
14 Ranganathan Street
Triplicane, Chennai – 600 005
Tel: 8571198 / 8530389

98. Medikraft Drugs &
Pharmaceuticals P Ltd.
No.3, Arya Gowda Road,
West Mambalam,
Chennai – 600 033
Tel: 4735288, Fax: 4830716

99. Midhula Formulations Pvt Ltd.
75-A, Ellaiamman Koil St
Sastri Nagar, Adayar,
Chennai – 600 020. Tel: 4460148

100. Medline Pharmaceuticals
60-A, R.K. Shanmugam Salai
K.K. Nagar, Chennai – 600 078
Tel: 4815807

101. Merbon Laboratories
14, Covelong Muthu Gramani St.
Periamet, Chennai – 600 003
Tel: 5393977

102. Mediseach Pharmaceuticals Ltd.
16, First Floor,
Mylai Ranganathan Street
T. Nagar, Chennai – 600 017
Tel: 4342867, Fax: 4343346

103. Novel India
41/1, Karambakkam I Main Road
Porur, Chennai – 600 116
Tel: 4766540 / 4766836

104. Naatson Healthcare (P) Ltd.
6. Vel Murugan Street
West Kamakodi Nagar
Valasaravakkam,
Chennai – 600 087
Tel: 4864437, Fax: 4862192
E-mail: naatson@vsnl.com

105. Nivaram Pharma (P) Ltd.
Nivaram Buildings
Majestic Colony, Valasaravakkam
Chennai – 600 087
Tel: 4867412 / 4868862

106. Nordic Pharmaceuticals (P) Ltd.
1/310, Mount Poonamallee Road
Ayyappanthangal,
Chennai – 600 056 Tel: 6273321

107. Nordic Pharmaceuticals P Ltd.
1/310, Mount Poonamallee Road
Ayyappanthangal,
Chennai – 600 056

108. Neumed Lab
60 Swamy Pandaram St.
Chennai- 600 002
Tel: 8410397 / 8534946

109. Nattura Bio Care Pvt. Ltd.
E-4, 56th Street,
Ashok Nagar, Chennai – 600 083

110. Ormech Pharma Pvt. Ltd.
28, Pattammal Street
Somu Mudali Colony,
Mandaveli, Chennai – 600 028
Tel: 4937456

111. Oswin Pharmaceuticals
2/134, M.C.N. Nagar,
7th Street, Thoraipakkam,
Chennai – 600 096. Tel: 4965820

112. Orchid Chemicals &
Pharmaceuticals Ltd.
No.1. 6th Floor, Crown Court
34 Cathedral Road,
Chennai – 600 086
Tel: 8111532 / 8110776;
Fax: 8114983
E-mail: orchid@giasmd01.vsnl.net.in

113. Pharma Research & Analytical Laboratories
No.8, Old Trunk Road,
Pallavaram,
Chennai – 600 043, Tel: 2358831

114. Prizm Pharmaceuticals
1408, Golden Colony
Mugappair, Chennai – 600 050
Tel: 6230001/02/03
E-mail: prizm@eth.net
prizm@vsnl.com

115. Polycare Pharmaceuticals
No.1. Sethu Street, Saligramam
Chennai- 600 093

116. Professional Pharmaceuticals
69 Balaji Nagar
Padi, Chennai – 600 050
Tel: 6541378

117. Pharm India
70, T.H. Road,
Chennai – 600 019
Tel: 8530604, Fax: 8528790

118. Paris Dekner Microspherules (P) Ltd.
68A, Vembuliamman Koil St
Alandur, Chennai – 600 016
Tel: 2329837 / 2312896
Fax: 2312892

119. Pharm Products (P) Ltd.
AH- 196, III Street,
Shanthi Colony,
Anna Nagar, Chennai – 600 040
Tel: 6216635, Fax: 6222415
E-mail: pplm@vsnl.com

120. Polaris Health Care (P) Ltd.
18, Dr. Nair Road,
T.Nagar, Chennai – 17
Tel: 8211390

121. Quanta Formulations
25, Ramakrishna Nagar Extn.
Alwar Thirunagar
Chennai – 600 087
Tel: 4862927, Fax: 6445579

122. Retort Laboratories
2 McNichols Road, II Lane,
Chetput
Chennai – 600 031
Tel: 8260924, Fax: 8257453
E-mail: retort@md3.vsnl.net.in

123. Rakod Laboratories
C-6, Mugappair West Ind. Estate
Chennai – 600 058, Tel: 6257069

124. Raptakos Brett & Co Ltd.
66 Velacherry Road, Chennai – 42
Tel: 2451236 / 2451289,
Fax: 2450479
E-mail: rbclcom@md4.vsnl.net.in

125. Raymond Pharmaceuticals P Ltd.
19, II Cross Street,
Dr. Radhakrishnan Nagar,
Thiruvamiyur, Chennai – 600 041

126. Romet Laboratories (P) Ltd.
1 Naidu Gardens,
Kanniamman Nagar
Vanagaram, Chennai – 602102
Tel: 4764055 / 4764924 / 4322011

127. Reward Pharmaceutical
436, T.H. Road,
Chennai – 600 021
Tel: 5976996

128. Ross Robbinz
553/1, Multi Industrial Nagar
Kunrathur High Road
Girugambakkam- 602 101
Tel: 4825717

129. Sowparnika Herbal Extracts and Pharmaceuticals (P) Ltd.
J Block, 15th Main Road
Anna Nagar, Chennai- 600 040

130. Sankar Labs
86/1, Lake View Road,
Chennai – 600 033
Tel: 4891938

131. Sersan Pharmaceuticals Ltd.
14, Nagarjuna Nagar, II Street,
Rangarajapuram, Kodambakkam
Chennai – 600 024
Tel: 4818158 / 4818207
Fax: 4815072
E-mail: sresan@giasmd01.vsnl.net.in

132. South East Pharmaceuticals
SBI Buildings
SIDCO Industrial Estate,
Chennai – 600 098
Tel: 6357365

133. Stedman Pharmaceuticals (P) Ltd.
No. 3A, Adayar Bridge Road
Adayar, Chennai – 600 020
Tel: 4911355 / 4462334
Fax: 4912624
E-mail: stedmanpharma@vsnl.com

134. Sri Agpa Pharmaceuticals
60 Swamy Pandaram Street
Chintatripet, Chennai – 600 002
Tel: 8534946, Fax: 4455228
E-mail: sriagpa@hotmail.com

135. SPIC Ltd. Pharma Dvn.
Plot No.5, NH-7,
Maraimalainagar, Pin- 603 209.
Tel: 453271 / 453273
Fax: 452407

136. SS Pharma,
No.36 (Old No.42) I Floor,
Veerabhadran Street,
Nungabakkam,
Chennai – 600 034
Tel: 8265222 / 8278135
Fax: 8262750
E-mail: rudhraa@eth.net

137. Sai Mirra Innopharm (P) Ltd.
124, L.B. Road, Adayar,
Chennai – 600 020
Tel: 4403787, Fax: 4403781
E-mail: saimirra@eth.net.in

138. Sai Mirra Pharmaceuticals (P) Ltd.
155, Medavakkam Road,
Kilkattalai,
Chennai – 600 117

139. Sarguru Pharmaceuticals (P) Ltd.
82, Josier Street Nugambakkam,
Chennai – 600 034
Tel: 820 5382 / 8205381
Fax: 8240139

140. SKN Organics
851, 91st Street, 13th Sector,
K.K.Nagar, Chennai – 600 078
Tel: 4835305

141. Spenchem Pharmaceuticals P Ltd.
1, First Floor, 1st Main Road
Gandhi Nagar, Adayar
Chennai – 600 020
Tel: 4454802

142. Success Pharmaceuticals Labs
8, Rosary Church Road
Mylapore, Chennai – 600 004
Tel: 4941344

143. The Sincere Remedies
122 Ramadoss Street
Opp: Model School, Ambattur,
Chennai – 600053
Tel: 6580664

144. Susruta Agencies (Mas) (P) Ltd.
Flat No.1, Komal Apartments
Old No.12, New No.18,
Jagadeeswarar Street, T. Nagar
Chennai – 600 017
Tel: 4352818 / 4355403
Fax: 4356550
E-mail: susruta@md2.vsnl.net.in

145. Subash Pharma (P) Ltd.
58-59, VGN Nagar
Ayyappanthangal, Chennai – 56
Tel: 6274158

146. Sipali Chemicals
P.O. Box. No. 3068
33 Elaya Mudali St, Chennai – 21
Tel: 5954834, Fax: 5954132

147. Shelat Bros
Shelat House, No.6 Kesava Iyer St
Chennai – 600 003, Tel: 5352081

148. Svaidyam Pharmaceuticals P Ltd.
11A, Arcot Road, Porur,
Chennai – 600 116, Tel: 4767655

149. Safeline Formulations
151, L.B. Road, Thiruvanmiyur
Chennai – 600 041, Tel: 4420255

150. Sriram chemicals
12, Chittibabu Street, Chetput,
Chennai –31, Tel: 8261550

151. Shield Pharmaceuticals
17/1, Jagannathan Nagar
II Main Rd.
Arumbakkam, Chennai – 16
Tel: 4750709

152. Satven & Mer
6th "Floor" Arcot Terrace
160 NSK Salai, Vadapalani
Chennai – 600 026
Tel: 4729903 / 4729891

153. Sun Beam Pharmaceuticals
41/1, Karapakkam I Main Road
Porur, Chennai – 600 116
Tel: 4766836

154. Triton Healthcare (P) Ltd.
4 Sengalvarayan Street
Shenoy Nagar, Chennai – 30
Tel: 6601599 / 6601298
Fax: 6454006

155. TTK Healthcare Ltd.
New No.5, Old.No.8,
Old Trunk Rd.
Pallavaram, Chennai – 600 043
Tel: 236883 / 2368872
Fax: 2367535
E-mail: ttkpl@giasmd01.vsnl.net.in

156. TTK LIG Ltd.
6 Cathedral Road
Chennai – 600 086
Tel: 8111999, Fax- 8117150

157. Twenty- First Century
Pharmaceuticals (P) Ltd.
SIDCO Estate, Chennai – 600 098

158. Triumph Herbals
8/27, A R Street (Chellamal St)
Janaki Nagar, Valasaravakkam,
Chennai – 600 087, Tel: 4817805

159. Triumph Formulations
777 Munaswamy Salai
K.K. Nagar West, Chennai – 78
Tel: 4743924

164. Tejpal & Co
109, Nyniappa Naicken St

173. Prize Pharmaceuticals
40, Coral Merchant Street

160. Tablets (India) Ltd.
T.H. Road, Chennai – 81
Tel: 5953263, Fax: 5956767

161. Tanmed Pharmaceuticals
18, Dr. Ambedkar Road
Kodambakkam, Chennai – 24
Tel: 4840536

162. Tychos Therapeutics
PK-5, SIDCO Industrial Est.
Ekkattuthangal
Chennai – 600 097

163. Technomed
L-484, 21st Cross,
Thiruvallur Nagar,
Thiruvanmiyur, Chennai – 41
Tel: 4415003

164. Tejpal & Co
109, Nyniappa Naicken St
Chennai – 600 003
Tel: 5355623

165. Unilab India Pvt. Ltd.
124 Poonamallee High Road
Velappanchavadi, Chennai – 77
Tel: 6801670 / 6800890

166. Venture Laboratories (P) Ltd.
379/4, I Main Road,
Virugambakkam,
Chennai – 600 092

167. Venus Laboratories
8 East Club Road. Shenoy Nagar
Chennai – 30, Tel: 6471365

168. Wardex Pharmaceuticals P Ltd.
55 Nelson Manickam Road
Aminjikarai, Chennai – 600 029
Tel: 3741010 – 13
Fax: 3741013

169. Wockhardt Healthcare Ltd.
69-72, SIDCO Pharmaceutical complex, Alathur – 603 110
Tel: 954114-466310

170. Zyma Healthcare Ltd.
41/1, Karambakkam I Main Road
Porur, Chennai- 600 116
Tel: 4766540

171. Zendic India Pharmaceuticals (P) Ltd
10, Devajulu Street, Ayanavaram,
Chennai – 600 023, Tel: 6454592

172. Nebulae Healthcare Ltd.
10, Bala Street, Thiruvamyur
Chennai – 600 041

173. Prize Pharmaceuticals
40, Coral Merchant Street
Mannady, Chennai – 600 001

174. Bhuvaneswari Corporation Ltd.
No.9. Old Trunk Road
Pallavaram, Chennai – 600 043
Tel: 2402921 / 2402869

175. Biodex Pharmaceuticals (P) Ltd.
61 Fathima Nagar,
Valasaravakkam
Chennai – 87, Tel: 4862366

176. Burgeon Pharmaceuticals (P) Ltd.
No.5, Chakrapani Road, Guindy,
Chennai – 32, Tel: 2456812

177. Bullwark Pharmaceuticals
2/279, Pillayar Koil Street
Thoraipakkam, Chennai – 96
Tel: 4961510

178. Healers India Pharmaceuticals (P) Ltd.
37, Karpagavinayagar Koil St
Alandur, Chennai – 600 016
Tel: 233196 / 2322483

179. Kristopharm Pvt. Ltd.
Lakshmi School Road
Mel-Ayyambakkam
Chennai – 602 102
Tel: 6630437 / 6256028

180. Naturechem India Ltd.
8, Cathedral Road,
Chennai – 86

181. Pradeep Drugs Co Ltd.
Sathammah Village, Karunguzhi P.O Madhurantakam Taluk
Kancheepuram Dist – 603303
Tel: 954115-77272/ 77295

182. Pharma Dynamic Co.
22 Third Street, Railway Colony
Nelson Manickam Road.
Chennai – 600 029

183. Spectromed Pharmaceutical
M36/1, 7th Cross Street,
Besant Nagar, Chennai – 90
Tel: 4714745

184. Shriram Chemicals
No.12, Chitti Babu Street
Chetput, Chennai – 31
Tel: 8261550

185. South India Antibiotics
2-A, New Natarajapuram Street
MMDA Colony, Arumbakkam,
Chennai – 600 106

186. Tulip Pharmaceuticals
22 Palace Road, Mylapore,
Chennai – 4, Tel: 4982264

187. Health India Laboratories
No.10, Ellaiamman Koil Street,
First Avenue, Sastri Nagar,
Chennai – 600 020

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